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Kimberly-Clark Dedicate New Wadding Mill

About 2,000 Persons Attend Ceremonies On Completion of New Manufacturing Unit of Kimberly-Clark Corp. At Neenah, Wis.— State Forest Plantings In 1940 Cover 20,000 Acres—Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., December 16, 1940 — Approximately 2,000 persons attended the dedication of the Kimberly-Clark Corporation's new mill completed recently at Neenah, Wis. The festivities were held Saturday afternoon and evening, December 14, with employees and their families and company officials taking part.

The mill is a three-story addition to the Badger-Globe unit, and will be devoted largely to the manufacture of coarse wadding for a new insulation product. Construction had been in progress during the summer and fall, and the equipment was installed within the last few months, including one machine to manufacture the wadding.

Ceremonies started with the dedication of a new concrete bridge erected at the rear of the Badger-Globe mill across the Fox River Canal to facilitate truck traffic. The mill band played a public concert on the bridge.

Visitors Escorted by Band to Mill

From there the crowds were escorted by the band to the mill, where a dedication program was conducted from the mezzanine of the machine room, which is 227 feet long. F. J. Sensenbrenner, president of the company, and Mayor Edwin A. Kalfahs of Neenah, both spoke at the bridge dedication and at the mill ceremonies. Another speaker on the mill program was Ernst Mahler, executive vice-president. The band furnished a concert, and the visitors spent the remainder of the afternoon inspecting the building and machinery. Signs were posted at each machine to explain its operations, and guide accompanied groups to each department. The spacious mill building was used for a dance in the evening.

Committees in charge of the dedication included the following: Building preparation, J. N. Kimberly and Clarence Lande; band, Donnie Brown and Phil Lewis; speakers, J. H. Kimberly, William Kellett and Forest Werling; open house, Les Johnson, James Murphy, George Kronschnabel and Leo Madison; orchestra, J. H. Kimberly and Robert De Wilde; publicity, Robert Wood and Robert Mott.

New Machine Wire 133 Inches Wide

Some work remains on the installation of machinery, and the corporation expects to have the mill in operation about January 1. The new crepe wadding machine is expected to be tested December 18. It has a wire width of 133 inches, and will run at a maximum speed of 2,000 feet per minute.

Every modern development in manufacturing plants has been incorporated in the new mill. It covers an area of 17,176 square feet and has a total floor area of 55,500 square feet, or about 1¼ acres. It is 227 feet long by 75 feet wide, with an inside height of 71 feet.

In all, 555 tons of structural steel and 120 tons of reinforcing steel were used. The building also has 8,832 square feet of glass brick, more than in any building in Wisconsin. Scientific lighting and air-conditioning have been provided. The machine room will be lighted from diffusing fixtures set flush in the ceiling, and will be augmented by spotlights mounted on wall brackets that will focus on particular work areas.

Architects for the plant are Skidmore, Owings and Merrill of Chicago. The engineering was done by the Kimberly-Clark staff, and the general contractor was the Seisel Construction Company, Milwaukee, Wis. Ground was broken for the building March 18, and it was completed and ready for installation of machinery September 14. Equipment and machinery were installed by 200 skilled workers of the Kimberly-Clark erection division in 11 weeks.

Forest Plantings Cover 20,000 Acres

Forest plantings by the Wisconsin Conservation Commission during the year 1940 amounted to 20,000 acres, involving the distribution of nearly 40,000,000 trees produced in state nurseries. This is the greatest year of reforestation since the program was started by the state in 1911. New plantings are off to a good start because of favorable growing weather and ample rains.

An inventory shows that the state nurseries at

(Continued on page 18)

Abitibi Bondholders Plan Called Unjust

Stockholder Protests Against Bondholders Obtaining Control of Abitibi Power & Paper Co. As Damaging To Investors In Common Shares — Testimony On Company Assets, Earnings and Prospects.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., Dec. 16, 1940—Further evidence of the widespread interest in the muddled affairs of the Abitibi Power and Paper Company came before the royal commission investigating the position of the company in receivership, when Mr. Justice McTague and Sir James Dunn, his fellow commissioner, resumed sittings in the legislative chambers Monday morning, without A. E. Dyment, who was absent through illness. A letter was received from Harold L. Mack, Delmonte, Cal., protesting against allowing bondholders of Abitibi obtaining control of the rehabilitated company and claiming that his investment of half a million dollars would, if the bondholders had their way, be worth only $5,000.

Stockholder Protests Bondholder Control

Mr. Mack's letter stated that he had invested $500,000 in 1927 in the Abitibi Power and Paper Company believing that it was a sound proposition. It seemed to him obviously unfair, he said, that the bondholders should take control of the rehabilitated company, reimburse themselves in full and make money, while bona fide stockholders were frozen out. Some of the stockholders, like himself, he said, had invested in the company long before the bondholders, while many bondholders had bought after the company went into receivership, at bargain prices for the bonds. These bondholders would get paid 100 cents on the dollar, while, Mr. Mack said, his own $500,000 worth of stock would be worth only $5,000 at today's market prices.

Mr. Mack emphasized that the name of the British people had become synonymous with justice, and he could see no justice in the proposal to hand over the company to the bondholders.

Testifies on Abitibi's Earnings

The first witness heard was Arthur D. Cobban, vice-president of Wood, Gundy & Co., who presented a memorandum to the commission on the newsprint industry and the affairs of Abitibi Power and Paper Company, the purpose of which was to show that facts bear out directly that earnings of Abitibi for the last 24 years have been substantially in excess of bond interest requirements; that the Canadian newsprint industry over the past 24 years demonstrates inherent soundness of the industry; the present competitive situation, as it affects Abitibi, and the industry generally, justifies confidence in the prosperity of the newsprint business; the value of the Abitibi assets from the point of view of earning power and possibility of replacement, is greatly in excess of liabilities.

He presented earnings figures in all cases before allowing for depreciation, which he maintained showed that "in only five of the 24 years did earnings fall below present bond interest requirements, and in no year did the business show an operating loss."

Mr. Cobban thinks that "one is at least justified in expecting a maintenance, if not a reasonable improvement in current conditions in newsprint." Industry, he feels, can expect a "sound development period" following this war.

Regarding the export position of Canadian newsprint Mr. Cobban says that since 1925 Canadian exports overseas have always exceeded United States imports of newsprint from Europe. He contends that at no time in the last 24 years has Scandinavian newsprint been a source of embarrassment to Canadian newsprint producers. "The facts are that the natural markets for Scandinavian paper are in Europe and Great Britain just as the natural market for Canadian newsprint is in the United States," he says.

He deplores the "foolish" price policy of the newsprint industry during the 1930's when, "the taking of orders for a comparatively few thousand tons of paper, at cut prices, resulted in smashing the price structure and involving the whole newsprint industry in annual losses aggregating many millions of dollars."

Calls Newsprint Prospects Best in Years

The present competitive position of the newsprint industry, Mr. Cobban claimed, is more satisfactory than at any time in the last 15 years.

Mr. Cobban was armed with voluminous facts and figures, charts and graphs and gave data to illustrate his proposition that the trends in Abitibi earnings were similar to those of all United States corporations which report to Washington, and also to Canadian and United States companies whose business, like that of Abitibi, is founded on the use of basic raw materials.

Dealing with Abitibi's assets Mr. Cobban stated that the consolidated balance sheet at December 31, 1927, just before the last public issue of securities of $50,000,000 bonds was made, showed, after adjustments, net assets (after deducting all liabilities excepting funded debt), of more than $140,000,000. According to the balance sheet of Oct. 31, 1940, the book value of assets was shown at $117,629,237, including book value of common shares of Provincial Paper Co. of $1,500,000 (against net current assets of $3,184,209). Mr. Cobban stated that the difference in the value of the assets between these two dates was due, it was understood, mainly to the fact that approximately $22,000,000 was written off the value of timber limits and because certain write-offs were required in connection with the sale of fixed assets.

Working Capital Declines in 1930

Mr. Justice McTague expressed surprise that a company like Abitibi, with a working capital of $15,000,000 before 1929, should be in receivership in 1931. Mr. Cobban would not admit that the Ontario Power Service Corporation and Thunder Bay projects had a major part in the Abitibi receivership, but he said one of the contributing factors might

have been the large amount of money taken out of working capital for Thunder Bay.

In 1929, Mr. Justice McTague said, Abitibi had $15,000,000 working capital. In 1929 it was down to $9,000,000, and in 1931 the company was in receivership.

Between Jan. 1, 1926, and Dec. 31, 1930, new newsprint machines, together with the almost precipitous decline in consumption, consequent upon world depression, caused demoralization of the industry, Mr. Cobban said. Newcomers cut prices from $70 a ton in 1927 to $40 in 1933.

At the present time, Mr. Cobban said, all companies with sound mills can operate at comfortable profits. Improvident expansion and waste of timber will not be permitted in future, because of provincial control. He doubted Southern United States pine, talked about for years, is likely to be a serious factor, nor is Scandinavian competition likely to be more dangerous in the future than in the past. While radio has been a restricting factor, newsprint consumption has substantially increased as business conditions have improved.

The investigation is still proceeding.

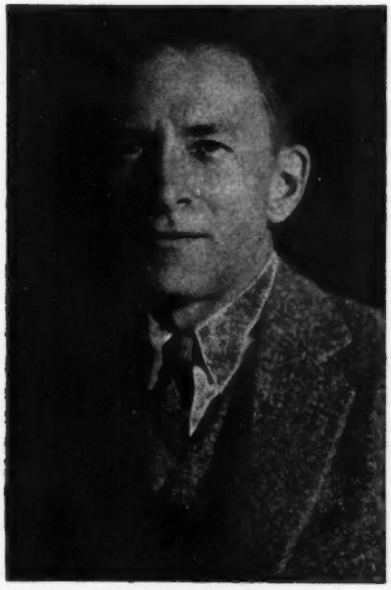
Pulp Importers Elect Officers

At the annual meeting of the Association of American Wood Pulp Importers, held at the Waldorf-Astoria, New York, on December 5, the following officers were reelected:

President, Johannes Westergaard, Atterbury Brothers, Inc.; vice-president, Pehr G. A. Sparre, Cellulose Sales Corporation; treasurer, J. Allan Millar, Perkins-Goodwin Co.; secretary, William Roach, Atterbury Brothers, Inc.; director, C. B. Overton, Castle & Overton, Inc.

Northwest Appoints Vice Presidents

The board of directors of the Northwest Paper Company, with mills at Cloquet and Brainerd, Minn., announce the appointment of C. I. McNair, Jr., to be vice-president in charge of manufacturing and L. F. Porter to be vice-president in charge of sales, both appointments effective December 10, 1940.



C. I. McNair, Jr.

L. F. Porter

Would Reduce Duties on Paper

A bill introduced by Congressman Cullen of New York, according to the Import Committee of the American Paper Industry, proposes to exclude from the dutiable value of foreign merchandise any sales, excise or war taxes which may be imposed. Under long standing law and precedent the determination of duties on foreign goods is based, when at an ad valorem rate, on the foreign market price and, of course, such a price includes taxes paid by the purchaser.

While the measure is proposed as a means of giving aid to the British by facilitating the sales of their products in this country, it is in fact a radical tariff reduction by a blanket procedure. The bill will have strong support and if passed will have the immediate effect of reducing the American selling price of many imported papers. Some of these papers are:

Carbonizing tissue and other high grade tissue papers imported from the United Kingdom, dutiable at various rates. These papers are now subject to a British war tax of 33⅓ per cent. Typewriting and duplicating paper from the United Kingdom, on which the war tax is 33⅓ per cent. All forms of ground wood paper imported from Canada. The Canadian sales tax is 8 per cent. Pulpboard in rolls from Canada on which the sales tax is 8 per cent. Other paper boards and fiber boards imported from Canada on which the sales tax is 8 per cent.

The above are just a few typical grades. The fact is, however, that practically every grade of dutiable paper imported from Canada or the United Kingdom would be affected by the bill.

Because of its far reaching effects and the danger of its passage, the Import Committee recommends immediate action by the Paper Industry in *opposition* to the Cullen bill. A largely attended meeting of New York importers has already planned an aggressive campaign for the *passage* of the bill.

Paper Specialties in Good Demand This Year

Standard Lines More Quiet In Midwest Area As Christmas Holiday Nears—Higher Grades of Paper Stock Slightly Improved — Graphic Arts Federation To Study Paper Problems—Other News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., December 16, 1940—The Chicago paper market did little more than mark time during the past week as orders gave a typical example of "spottiness." No great amount of buying was in sight as buyers kept inventories pared down and as the industry itself wondered as to exactly when defense buying was going to have a specific effect on orders. Bond and ledger price listings from the various local paper houses indicated the stationery position of local markets where prices remained comparatively firm though with a certain amount of reported "soft spots." Sulphites, in particular, had a comparatively dull week. Newsprints and groundwoods were only slightly better though reports of mill preparations for 1941 were considered encouraging. Books and covers slipped through a week of dullness characterized, however, by some strong merchandising efforts to get off on January 1 to a flying start. Paper board markets were firm. Specialties winding up the Christmas demand were said to be satisfied with an unusually brisk holiday trade in which Chicago shared retail-wise. Krafts showed no indication of a change. The waste paper market improved slightly in the higher grades.

Uphold Trucking Act

The Sangamon County courts of Illinois recently upheld the Illinois Trucking Act passed by the last session of the Illinois Legislature. The Act and its provisions with reference to regulations, specifications and hours of work was described at the time of passage for the benefit of paper houses with truck facilities in this State. The decision of the courts will have little effect on procedure here as the great majority of the truck users had little doubt but what the statute would be held constitutional.

Traffic Men Meet

Traffic men will convene in Chicago as the Interstate Commerce Commission holds hearings on all-commodity rates covered by I & S Docket No. 4648 and 4670. Many companies are vitally interested in the hearings which are in the nature of a review of an order of a year ago which materially reduced freight rates from this territory to the West. The hearings held a year ago permitted the lower rates but required a continuation of investigations as to their effect on shippers and receivers. The Chicago meeting will be held December 17 at the Morrison Hotel.

New Paper Lines Announced

Included among the new lines announced during the past month by Chicago paper houses are several listed by Bradner Smith & Company in their most recent mailing to the trade. Listed are Bradner planograph EF Book which now comes in six sizes; New Perfection Litho which replaced Perfection Litho; Mirror Coated Gummed Paper; Wrenn's Hi Lustic Enamel Blotting papers and New Dura Glo, now stocked in white and six colors.

To Study Paper Problems

It is reported that the Chicago Graphics Art Federation, powerful organization of printers headed by S. F. Beatty, is now giving a great deal of consideration to certain problems affecting local paper houses. It is understood that the printers fully recognize the problem of the merchant in carrying stock for the convenience of his customers and a concentrated effort is to be made to study the trend among paper houses to extend credit to printers on the basis of securing chattel mortgages on printing plants.

November Newsprint Statistics

Production of newsprint in Canada during November 1940 amounted to 282,344 tons and shipments to 286,739 tons according to the News Print Service Bureau. Production in the United States was 85,338 tons and shipments 87,331 tons, making a total United States and Canadian news print production of 367,682 tons and shipments of 374,070 tons. During November, 31,254 tons of news print were made in Newfoundland, so that the total North American production for the month amounted to 398,936 tons. Total production in November 1939 was 397,971 tons.

The Canadian mills produced 537,296 tons more in the first eleven months of 1940 than in the first eleven months of 1939, which was an increase of twenty and four tenths per cent. The output in the United States was 70,994 tons or eight and two tenths per cent more than in the first eleven months of 1939, in Newfoundland production was 42,866 tons or fifteen and two tenths per cent more, making a total increase of 651,156 tons, or seventeen and three tenths per cent more than in the first eleven months of 1939.

Stocks of news print paper at the end of November were 175,931 tons at Canadian mills and 16,655 tons at United States mills, making a combined total of 192,586 tons compared with 198,974 tons on October 31, 1940, and 206,865 tons at the end of November 1939.

A. Germain Heads Hudson River Local

GLENS FALLS, N. Y., December 9, 1940—Arthur Germain was chosen president of the Hudson River Local, Pulp, Sulphite and Paper Mill Workers at a meeting held this week in the recreation rooms of Finch, Pruyn & Co. Among the other officers reelected were Arthur Huber, vice president, Louis Farkas, corresponding secretary, and Clifford Hovey, financial secretary. A committee composed of Messrs. Germain, Farkas and Hovey was named to make arrangements for the annual banquet of the organization to be held some time in January.

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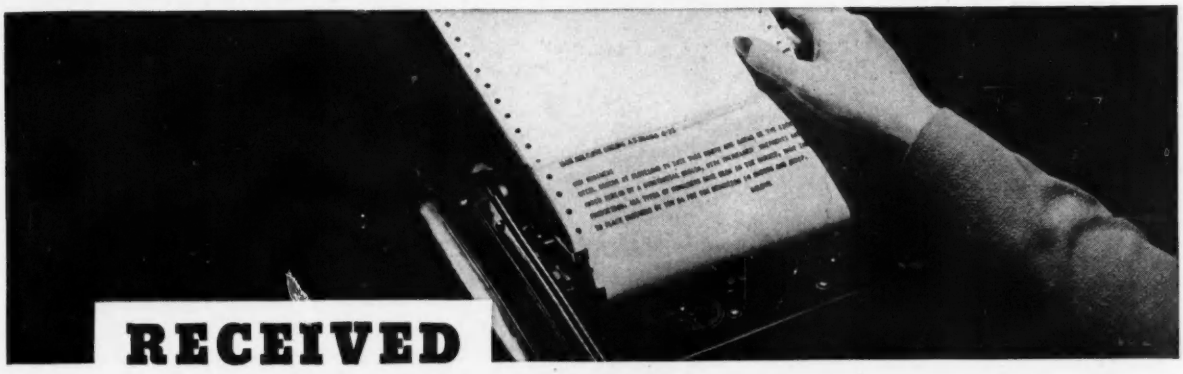

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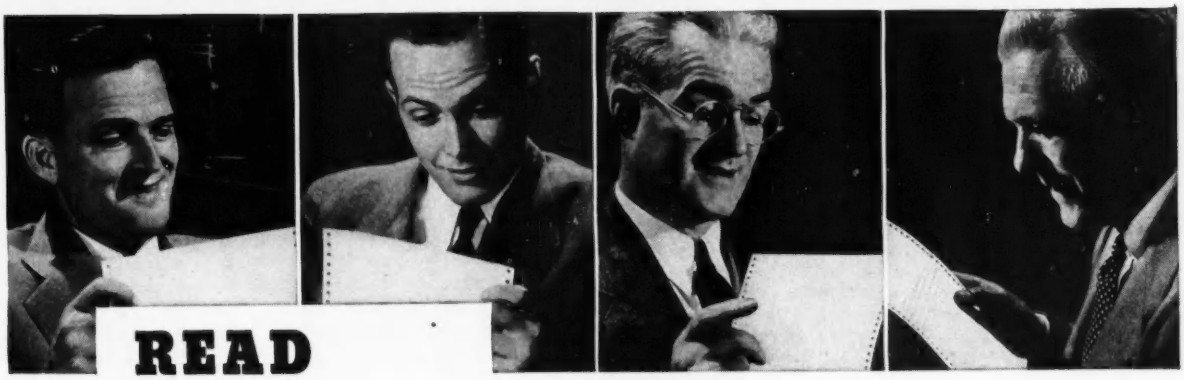

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KIMBERLY-CLARK DEDICATE NEW WADDING MILL

(Continued from page 13)

Wisconsin Rapids, Trout Lake, Gordon, Silver Cliff and Lake Tomahawk still hold more than 67,000,000 small trees to supply the continuation of the planting programs next spring and in succeeding years.

Varieties which make up the bulk of the stock planted in 1940 are Jack, Norway, white and Scotch pines and Norway and white spruce. Of the total number of trees, 25,000,000 went for county forest rehabilitation, nearly 3,000,000 for state-owned lands and 3,500,000 for farms.

Appeals for Fairness to Employers

An appeal to labor unions to consider the welfare of the employer as well as the worker was made to delegates of the Tri-State convention of pulp and paper unions at Appleton, Wis., Sunday, December 8, by Professor Edwin E. Witte, of the department of economics of the University of Wisconsin. He spoke at the closing banquet in the evening at Rainbow Gardens.

"Union leaders, to be good ones," said Prof. Witte, "must look years ahead. Union leadership long has recognized that all conditions of industry must be considered; not just wages, but whether industry can thrive and prosper under the conditions which the unions seek. Industry must have profits left; good unions always consider the welfare of the entire industry."

Among the employers who spoke were L. R. Watson, sales manager of the Tuttle Press Company, Appleton, and C. K. Boyer, manager of the Interlake Pulp and Paper Company division of the Consolidated Water Power and Paper Company, Appleton. Mr. Watson pointed out that the work of the sales department was directly affected by the work of union members in the company, for it is easy to sell a good product and hard to sell a poor one. Mr. Boyer declared that "we must protect and save what we call our democracy, and we are up against a real job. You and I, if we are to preserve this nation, are going to yield some of our liberties for the good of all. Employers and organized labor must give up some personal liberties. If this is not done voluntarily, it will be done by law."

Pulp Wood Cutters Discuss Wages

Discussion of fair labor standards and application of the wage-hour law were announced as the subjects of discussion at a meeting to be held Monday, December 16, at Rhinelander, Wis., by 624 Wisconsin pulp wood cutters. Thomas O'Malley of Chicago, regional director of the wage-hour division of the United States, said the meeting was called jointly by officials of seven paper mills on the Wisconsin River, and the wage-hour division. These mills are: Nekoosa-Edwards Paper Company, Nekoosa, Wis.; Marathon Paper Mills Company, Rothschild, Wis.; Wausau Paper Mills Company, Brokaw, Wis.; Tomahawk Kraft Paper Company, Tomahawk, Wis.; Mosinee Paper Mills Company, Mosinee, Wis.; Rhinelander Paper Company, Rhinelander, Wis.; and Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis.

Workers' Union Elect Officers

Officers of the Workers' Union of Kimberly, Wis., were reelected last week as follows: President, Otto Hannemann; vice-president, H. J. Kokke; secretary, Cornelius Kokke; treasurer, Bernard Spaay. The union is made up of employees of the Kimberly-Clark Corporation. One new director, Carl Le Noble, was elected to represent the warehouse and plant departments. Mr. Hannemann and Harold Fird have been reelected as representatives of the Kimberly mill on the board of directors of the Kimberly-Clark Mutual Benefit Association.

Philadelphia Sales Gain

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., December 16, 1940—With employment and purchasing power at a higher level than a year ago, the normal sales increases in paper and paper specialties in this area have added wide gains in holiday purchases, and on every side the paper merchants are prepared for the biggest buying rush since Easter, and although the weather here has at times been unfavorable it is predicted that despite weather conditions sales this year will greatly surpass the volume of last year.

The usual state of trade prevails at this time in the paper stock market, namely the softening of prices. The lower grades, notably news and mixed paper are lagging and prices are at the lowest they have been for some time.

Carthage Papermakers Hold Banquet

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., December 9, 1940—The annual banquet of the local branch of the International branch of Papermakers and the union affiliated with the International body of Pulp and Sulphite Workers was held early last week at a hotel in Deferiet with about 150 workers and families in attendance. All of the union members are employees of the Champion mill of the Taggart Corporation. The banquet was followed by a program of addresses and dancing. Among those giving short addresses were Glynn Traynor, office manager of the company, and Jacob Stephan, general representative of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers.

G-B Issues New Price List

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., December 16, 1940—The Garrett-Buchanan Company has just issued a new and novel price list, which contains three separate divisions—prices of papers, catalog of papers and an envelope price list. It is so arranged that if a customer selected a commodity he would just refer to "page so and so," and would have no trouble to find the article. Heretofore the prices were listed alongside the commodity but this year they have been separated, and if prices have to be changed it is only necessary to reprint the price list.

BELOIT IRON WORKS

BELOIT WISCONSIN

Bids and Awards for Government Papers

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., December 18, 1940—R. P. Andrews Paper Company has been awarded the contract for furnishing the Government Printing Office with 17,250 pounds of 50% rag, 21 x 32, No. 32 white bond paper at 10.53 cents. The same firm will also furnish 43,000 pounds of same No. 48 at 10.43 cents. Barton Duer & Koch Paper Company will furnish 20,000 pounds of 100% rag, 21 x 32 white ledger paper at 18.25 cents. The same firm will also furnish 4,000 pounds of same 21 x 32½ at 18.75 cents. Bids for these items were received on November 29.

Barton, Duer & Koch Paper Company and R. P. Andrews Paper Company will each furnish 168,000 pounds of 24½ x 32 white mimeograph paper at 4.37 cents, bids for which were received on November 27.

R. P. Andrews Paper Company will furnish 35,000 pounds of 24 x 36 basis rope manila paper in 48" rolls at 16.4 cents. Frank Parsons Paper Company will furnish 5,000 pounds of 50% rag, blue 22½ x 28½ index paper at 11.37 cents and Aetna Paper Company will furnish 78,000 pounds of 25% rag, 24 x 38 white bond paper at 9.94 cents. Cauthorne Paper Company will furnish 14,400 pounds of 20 x 25 granite smooth M.F. cover paper at 6.84 cents. Bids for all of these items were received on November 22.

Mudge Paper Company will furnish 15,800 pounds of 50% rag, 35 x 44 white bond paper at 10.43 cents, bids for which were received on November 20.

Barton, Duer & Koch Paper Company will furnish 16,000 pounds of 75% rag, 36 x 52 litho finish map paper at 12.90 cents. Same firm will also furnish 63,500 pounds of 24 x 38, 50% rag, white bond paper at 12.92 cents. Mudge Paper Company will furnish 15,100 pounds of 31 x 38" same at 10.48 cents. Bids for these items were received on November 15.

Marquette Paper Company will furnish 35,900 pounds of various color and size, 50% rag, manifold paper at 13.47 cents.

The Printing Office has received the following bids for 14,750 pounds of yellow and pink, 21 x 32 sulphite manifold paper; Walker Goulard Plehn Company, Inc., 7.91 cents; Old Dominion Paper Company, 7.99 cents; Whitaker Paper Company, 9.53 cents; Mudge Paper Company, 9.57 cents; Import Paper Company, 8.1 cents; Graham Paper Company, 8.85 cents; Enterprise Paper Company, 8.08 cents less 2%; L. Hyman & Sons, 8 cents; Mathers-Lamm Paper Company, 8 cents; Paper Corp. of U. S., 8.35 cents; and Eastern Corporation, 11.25 cents.

For 103,750 pounds of No. 1 quality binders board; Consolidated Paper Company, 3.34 cents less 2%; R. P. Andrews Paper Company, 3.325 cents; and Mathers-Lamm Paper Company, 3.4025 cents.

For 27,960 pounds of LOO7 rag, 30 x 42 litho finish chart paper; Barton, Duer & Koch Paper Company, 16.92 cents; Mudge Paper Company, 19.66 cents; Paper Corp. of U. S., 16.75 cents; and R. P. Andrews Paper Company, 19.66 cents.

For 7,207 pounds same, 36 x 52"; Barton, Duer & Koch Paper Company, 16.92 cents; Mudge Paper Company, 20.08 cents; Paper Corporation of U. S., 16.75 cents; and R. P. Andrews Paper Company, 20.08 cents.

For 80,000 pounds of newsprint paper in 36" rolls; National Pulp and Paper Company, 2.75 cents; Old Dominion Paper Company, 3.432 cents; and Paper Corp. of U. S., 3.2 cents.

For 12,500 pounds of 50% rag, 20 x 25 gray laid cover paper and same quantity same green; Whitaker Paper Company, 11 cents; Stanford Paper Company, 10.15 cents; Paper Corporation of U. S., 10.15 cents; Mudge Paper Company, 10.66 cents; Lee Paper Company, 9.97 cents; Cauthorne Paper Company, 10.98 cents; Barton, Duer & Koch Paper Company, 10.26 cents; and R. P. Andrews Paper Company, 10.37 cents.

For 37,000 pounds of 39 x 50 supercalendered book paper; Marquette Paper Company, 5.198 cents; R. P. Andrews Paper Company, 5.05 cents; Stanford Paper Company, 5.29 cents; Whitaker Paper Company, 5.28 cents; Mudge Paper Company, 5.198 cents; and Perkins-Goodwin Company, 5.17 cents.

For 115,200 pounds same 38 x 48; Marquette Paper Company, 5.06 cents; R. P. Andrews Paper Company, 5.05 cents; Stanford Paper Company, 5.11 cents; Whitaker Paper Company, 5.28 cents; Mudge Paper Company, 5.11 cents; and Perkins-Goodwin Company, 5.09 cents.

For 5,000 pounds of 50% rag, 21 x 32 pink manifold paper; Marquette Paper Company, 17.33 cents; Barton, Duer & Koch Paper Company, 16.98 cents; R. P. Andrews Paper Company, 17.95 cents; Whitaker Paper Company, 16.88 cents; Mudge Paper Company, 17.08 cents; and Walker Goulard Plehn Company, 17.07 cents.

For 13,000 pounds 21 x 32 green same; Barton, Duer & Koch Paper Company, 13.29 cents; R. P. Andrews Paper Company, 13.21 cents; Whitaker Paper Company, 13.21 cents; Mudge Paper Company, 13.37 cents; Walker Goulard Plehn Company, 13.36 cents; and Mathers-Lamm Paper Company, 15 cents.

For 6,500 pounds same cherry; Barton, Duer & Koch Paper Company, 13.29 cents; R. P. Andrews Paper Company, 17 cents; Whitaker Paper Company, 13.21 cents; Mudge Paper Company, 13.37 cents; Walker Goulard Plehn Company, 13.36 cents; and Mathers-Lamm Paper Company, 15 cents.

Buys Home at Watertown

DEFERIET, N. Y., December 16, 1940—Announcement is made here of the purchase by Floyd L. Carlisle, Jr., of a large colonial mansion at Watertown where he plans to reside. Mr. Carlisle, whose father perfected the present organization of the St. Regis Paper Company and became its controlling factor some time ago, will be associated with the research laboratory of the company in this village. The structure consists of twelve rooms and four baths and was constructed at a cost of more than $30,000. The mansion was previously occupied by Taylor D. Ward who was for some time engaged in the paper manufacturing business here. He left here about five years ago for Neenah, Wis., to form an association with a paper manufacturing concern at that place.

FROM his window the Superintendent of a chemical processing plant saw the stacks belching smoke that turned day into night. It happened before—just recently.

He suspected boiler trouble. "Maybe, there's one reason for production delays!" He grabbed a phone. "Why the blackouts, Bill?"

"The forced draft blower is acting up," replied the engineer, "the valve in the steam line's gone out again!"

Only a short time ago this valve was repaired. Yet, again, it was causing irregular boiler operation and fuel waste; in fact, it might have crippled the boiler completely! That's how Preventive Maintenance—the modern way of protecting against trouble by stopping it at the source—came into the case.

The engineer knew that valves shouldn't behave that way. But he wouldn't risk ordinary repair again. And through the Crane Man, R. B. H., he would benefit from Crane's wide experience and knowledge in applying the best corrective measure.

The first step in applying Preventive Maintenance is making sure that valves and fittings are right for working conditions.

Here was a renewable disc valve in the steam line to a turbine-type blower. It couldn't stand the "gaff" of constant throttling. The disc wouldn't last. The draft blower ran wild!

Preventive Maintenance counseled replacement with a Crane No. 14½P—a plug type disc valve designed for tough throttling jobs. Its materials and construction would safely resist the ravaging effects of throttled steam. It would give unvarying control of flow—keep the blower running at constant speed.

RESULTS: No more blackouts even after two years. The menace of interrupted boiler operation, fuel waste, even complete shutdown was eliminated with Preventive Maintenance. Another user of piping knows that the Crane Man can help get most for piping maintenance dollars. Because, Crane is not only the source of valves and fittings for every need, but also of accurate information on their proper usage.

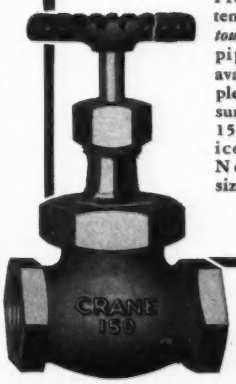
This case is based on the personal experience of R. B. H., a Crane Representative in our Minneapolis Branch.

TOUGH FLOW TAMED WITH CRANE BRASS PLUG DISC VALVES

In your boiler room—in any lines requiring severe throttling, you'll find these valves exactly right for the job. They're sound protection against trouble in blower, blow-off and boiler-feed services, in drip and drain lines.

The unusual stamina of these Crane valves is in their plug-type disc and seat construction. Materials are just the right combination for highest resistance to the corrosion and erosion of actual working conditions. The wide seating area repels the damaging effects of wire-drawing and foreign matter; assures long-lasting tightness. The tapered disc provides easy, positive regulation of flow.

With Crane Plug Disc valves, you can apply money-and-trouble-saving Preventive Maintenance to all the *tough* spots in your piping. They're available in a complete range of pressure ratings. For 150 pound services, specify the No. 14½P—in sizes up to 3 inches.



1940 our 85th YEAR

CRANE

CRANE CO., GENERAL OFFICES: 836 S. MICHIGAN AVE., CHICAGO

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

NATION-WIDE SERVICE THROUGH BRANCHES AND WHOLESALERS IN ALL MARKETS

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending December 18, 1940

	High	Low	Last
A. P. W.	2	1⅞	1⅞
Armstrong Cork Co.	29¾	29	29⅛
Celotex Corp.	7	6⅜	6⅜
Celotex Corp., pf.	68	67	67
Certain-Teed Products Corp.	4⅜	4⅜	4⅜
Certain-Teed Products Corp., pf.	37⅜	34	34
Champion Paper & Fibre Co.	20¼	20	20
Champion Paper & Fibre Co., pf.	105	104½	104½
Congoleum-Nairn Co.	16⅞	16	16
Container Corp. of America	15¾	15¼	15¼
Continental-Diamond Fibre Co.	7⅛	6⅞	6⅞
Crown-Zellerbach Co.	15⅜	14¾	14¾
Crown-Zellerbach Co., pf.	92	90⅝	91¾
Flintkote Co.	17	14	14
Robert Gair	2⅞	2¼	2⅜
Robert Gair, pf.	18½	17½	17½
International Paper & Power	16⅝	15	15
International Paper & Power, pf.	70½	68	68
Johns-Manville Corp.	61¾	60⅛	60⅜
Johns-Manville Corp., pf.			
Kimberly Clark Corp.	38½	38½	38½
MacAndrews & Forbes	30	29¾	29¾
MacAndrews & Forbes, pf.	135	135	135
Masonite Corp.	28	27½	27½
Mead Corp.	9	8½	8½
Mead Corp., pf.	66¼	66	66
Paraffine Companies, Inc.	37½	37½	37½
Paraffine Companies, Inc., pf.	103	103	103
Rayonier, Inc.	17¼	16¾	16¾
Rayonier, Inc., pf.	30	28½	28½
Ruberoid Co.	16¼	15½	15½
Scott Paper Co.	36¾	35⅛	35⅛
Scott Paper Co., pf.	110½	110½	110½
Sutherland Paper Co.	21¾	21¼	21¼
Union Bag & Paper Corp.	13	12⅜	12⅜
United Paperboard Co.	3⅜	3⅜	3⅜
U. S. Gypsum Co.	69¼	64	64
U. S. Gypsum Co., pf.	178¼	178	178¼

New York Curb Exchange

High, Low and Last for Week Ending December 18, 1940

	High	Low	Last
American Box Board Co.	4¼	4⅛	4⅛
Brown Co., pf.	17¼	16¾	16¾
Great Northern Paper	42	42	42
Hummel-Ross Fibre Corp.	6⅜	6	6
National Container Corp.	11¾	11¼	11⅜
St. Regis Paper Co.	2¾	2⅜	2⅜
St. Regis Paper Co., pf.	81½	80¼	80¼
Taggart Corp.	3¼	3¼	3¼

Champion Earns $356,817

The Champion Paper and Fiber Company for the twelve weeks ended November 10, reports a net income of $356,817, or 43 cents a common share; for twelve weeks ended November 12, 1939, net income $405,428, or 53 cents a share. For twenty-eight weeks ended November 10, 1940, net income was $1,176,747, or $1.62 a share; for the same 1939 period a net income of $725,805, or 85 cents a share was reported.

Flintkote Issues Notes

The Flintkote Company has reported the issuance of promissory notes aggregating $500,000 to the Bankers Trust Company. The notes mature serially from 1941 to 1950. The company had previously arranged with the bank to borrow up to $2,250,000 to finance plants and for other corporate purposes. The agreement, which specified that the initial borrowing would not be less than $500,000, expired December 1.

Crown Zellerbach Cuts Loans

The Crown Zellerbach Company between September 30 and November 30 paid $1,000,000 of bank loans maturing on August 1, 1941, reducing the total outstanding to $11,000,000, according to a recent report.

Central Paper Offers Shares

Offering of 52,013 shares of Central Paper Company, Inc., common stock of $1 par, represented by voting trust certificates at $10 a share by Riter & Co., of New York, Carlton M. Higbie Corp. and American Industries Corporation of Detroit and a group of investment dealers in the principal financial centers.

Central Paper's plant is at Muskegon. The company is known in the trade as a "technical mill" and manufactures a wide range of paper and paper products as well as its own pulp wood. In the last year products were sold to approximate 1300 separate accounts.

Sales for the fiscal year ended June 30, 1940, were $3,346,548 and net income after all charges amounted to $445,886, equal to $2.78 a share on the number of common shares outstanding as of Nov. 14, 1940. Assuming full conversion of the convertible preferred, 1940 earnings would be $2.02 a common share.

The shares in this offering are being purchased from present stockholders. Dividends currently are being paid at the rate of 15 cents quarterly and directors intend to augment this policy with extras when warranted.

Hammermill Offers Shares

Offering of 30,000 common shares of the Hammermill Paper Company was announced last week at 25⅝ by A. G. Becker & Co. and Merrill Lynch, E. A. Pierce & Cassatt, jointly. The stock was obtained from holdings of the estate of the late president of the company, E. R. Behrend, and from his widow, and does not represent new financing.

Merrill Lynch, E. A. Pierce & Cassatt announced oversubscription early yesterday of a block of 50,000 shares of Parke Davis & Co., stock offered at 30 through dealers.

Stevens & Thompson Elect Officers

At the annual stockholders' meeting of the Stevens & Thompson Paper Company on December 10, 1940, F. L. Stevens, F. N. Stevens, H. B. Thompson, Judge C. G. Wager, R. B. Stevens, and J. W. Bright were elected directors.

Following the stockholders' meeting the directors elected F. L. Stevens, chairman of the board; J. W. Bright, president; R. B. Stevens, vice president; H. B. Thompson, secretary and treasurer; and L. J. Stephens, assistant secretary and assistant treasurer.

Guaranty Container Corp. Formed

INDIANAPOLIS, Ind., December 16, 1940—Articles of incorporation have been filed with the Indiana secretary of state by the Guaranty Container Corporation, 808 Guaranty building, Indianapolis, formed to manufacture containers of all kinds. The corporation has 5,000 shares of no par value capital stock and the incorporators are George L. Glossbrenner, Charles L. Locke and John U. Busson.

DIAMOND *Liquid* CHLORINE *always*

COMES TO YOU IN MODERN, TROUBLE-FREE CONTAINERS!

To insure your *complete* satisfaction with Diamond Liquid Chlorine, DIAMOND not only provides the finest product you can buy, but also goes far beyond ordinary service requirements in eliminating potential sources of trouble and annoyance from the containers in which Liquid Chlorine is shipped to you.

For example, before filling, each cylinder and tank car is thoroughly cleaned and inspected; each valve is removed, taken apart and inspected, valve seats reground if not seating properly, the valve repacked and tested to 700 pounds pressure; the deep-drawn seamless steel cylinders are tested to 500 per cent of normal pressures, and are kept neatly painted with aluminum paint.

These few instances indicate the seriousness with which DIAMOND assumes its obligation to deliver Liquid Chlorine in a form most acceptable and usable to you. And, this being the case, you can free your mind completely of Liquid Chlorine worries by specifying DIAMOND!

DIAMOND ALKALI COMPANY
Pittsburgh, Pa. and Everywhere

CHLORINE

CONSTRUCTION NEWS

Kalamazoo, Mich.—The Sutherland Paper Company, manufacturer of box board, paper dish board, etc., has taken out a permit for new addition to mill on East Paterson street, consisting of a one-story structure, to be equipped for the production of cartons. Cost reported over $50,000. Work is scheduled to proceed at once.

Marrero, La.—The Celotex Corporation, Marrero, near New Orleans, manufacturer of insulating board, wall board, etc., has approved plans for new addition to mill, to be one-story, about 195 x 300 feet, primarily for storage and distribution. It is reported to cost over $140,000, with equipment. Bids have been asked on general erection contract and work is scheduled to be placed under way soon. Main offices of company are at 919 North Michigan avenue, Chicago, Ill.

Philadelphia, Pa.—The Penn Paper and Stock Company, 910 Brown street, commercial and special paper stocks, poster papers, etc., will take over a group of industrial buildings on Washington avenue, near 11th street, recently purchased by the William J. McGarrity Estate for lease to the company. The buildings are of two, four and five-story type, totaling about 97,000 square feet of floor space, with site, 110 x 275 feet, extending to Peters street. Company will make improvements at once, and plans early occupancy for large increase in present facilities.

Oklahoma City, Okla.—The Carpenter Paper Company, 27-29 East Grand avenue, commercial and other paper products, has begun superstructure for new one-story and basement building, 140 x 248 feet, at 918 Olie drive, recently referred to in these columns. It will be used for storage and distributing service, providing large increase in present capacity, and is estimated to cost approximately 100,000, with equipment. Ellis, Nicholson & Cramer, Hightower Building, Oklahoma City, have the contract for erection. Sorey, Hill & Sorey, First National Bank Building, Oklahoma City, are architects.

Camden, Ark.—The William Roofing Company, East Second street, Little Rock, Ark., manufacturer of prepared roofing, roofing papers, etc., has plans nearing completion for erection of new plant in the vicinity of the stockyards at South Camden, to replace a mill at Waterloo, Ark., recently destroyed by fire. New plant will be one-story, about 25 x 320 feet, reported to cost over $50,000, including equipment. It is expected to begin erection soon. J. M. Williams is head.

Hoquiam, Wash.—Rayonier, Inc., Grays Harbor Division, manufacturer of bleached sulphite pulp, has completed plans for addition to power house at mill, with installation to include a new 2000-kw. turbine-generator unit and auxiliary equipment. Erection will be carried out by company forces, and will be placed under way at once. Cost reported over $85,000, with equipment.

St. Marys, Ga.—The St. Marys Kraft Corporation, St. Marys, an interest of the Gilman Paper Company, Gilman, Vt., lately organized, has active work under way on proposed new mill near Kingsland, Ga., vicinity of St. Marys, previously referred to in these columns. Foundations are in progress for several of the main mill units, as well as recovery building and power house; the site has been practically cleared for all buildings to be erected at this time, while work on road leading to site, and railway siding, is approximately 65 per cent completed. Additional contracts are being awarded for different branches of construction, including steel erection to Steel Erectors, Inc., 50 Church street, New York, N. Y.; and for iron floor grating to the Kerlow Steel Flooring Company, 222 Culver avenue, Jersey City, N. J.; also awards to a number of local companies for brick, cement, welded wire mesh, concrete aggregates and miscellaneous materials. Plant will comprise several large one and multi-story buildings, to be equipped for the production of sulphite pulp. Plant will have an initial rating of about 100 tons per day, and is reported to cost over $2,500,000 with machinery. It is scheduled for completion in the spring of 1941. The Morton C. Tuttle Company, Park Square Building, Boston, Mass., has the general erection contract. George F. Hardy, 305 Broadway, New York, N. Y., is consulting engineer.

Mankato, Mill.—The Paper Supply Company, 620 South Front street, commercial paper products, is considering plans for the rebuilding of one-story storage and distributing plant, recently partially destroyed by fire. Estimates of cost are being made.

Nashua, N. H.—Johns-Manville Corporation, 22 East 40th street, New York, N. Y., manufacturer of insulating board, wall board and kindred products, has approved plans for new addition to branch mill at Nashua, consisting of a one and two-story unit, 50 x 640 feet, to be used for storage and distribution. It is estimated to cost over $175,000, with equipment. Erection contract has been awarded to George Belanger & Son, Inc., Nashua, and work will be placed under way at once. This is part of an expansion program of company recently authorized.

Toronto, Ont.—Canadian Wire Bound Boxes, Ltd., 1000 Gerrard street East, manufacturer of wirebound corrugated paper boxes and containers, has plans for new one-story addition to plant, about 113 x 125 feet, for large increased capacity in production department, storage and distributing divisions. It is reported to cost over $80,000, including equipment. J. M. Cowan, 9 Marguretta street, Toronto, is architect.

New Companies

Union City, N. J.—The United Container Corporation has been incorporated with capital of $125,000, to manufacture corrugated boxes and containers of various kinds. New company is represented by Lionel Isaacs, 143 Summit avenue, Union City, attorney.

New York, N. Y.—Beinowitz & Son, Inc., has been organized with capital of 100 shares of stock, no par value, to deal in paper goods of various kinds. New company is represented by Louis Levine, 11 West Forty-second street, New York, attorney.

Monticello, N. Y.—The H. L. Paper Supply Company has been chartered with capital of 100 shares of stock, no par value, to deal in paper prod-

ucts of various kinds. New company is represented by Isaac Silberman, Masonic Building, Monticello, attorney.

Hoboken, N. J.—The Bakery Paper Package Manufacturing Company has been incorporated with capital of $125,000, to manufacture paper containers and packages for food product service. New company is represented by George E. Damrow, Hoboken, attorney.

New York, N. Y.—The Ajax Board Corporation has been organized with capital of 100 shares of stock, no par value, to manufacture and deal in paper board products. New company is represented by Blackstone Stationers, 63 Park Row, New York, agents.

Says Paper Tariffs Foster Monopoly

The Temporary National Economic Committitee, headed by United States Senator O'Mahoney, according to the Import Committee of the American Paper Industry, has issued a monograph on Industrial Concentratioin and Tariffs in which several types of paper are held to be affected by minor monopolistic elements, fostered by tariff protection. The monograph lists M. G. sulphite wrapping paper, M. G. kraft wrapping paper, leatherboard, cigarette paper, vegetable parchment paper and "book paper containing ground wood," as those grades of paper in which "a substantial reduction of the duty would increase imports and lower prices."

The report can and undoubtedly will be used as the basis for an attack on tariff rates on the commodities listed. The report takes no account of the profits now earned by companies producing the grades listed, but assumes that if four companies produce more than 75 per cent of the domestic output there must be a monopolistic tendency in that product.

The report was written by Clifford L. James, associate professor of economics at Ohio State University, assisted by other economists. The Temporary National Economic Committee, while sponsoring and publishing the report, specifically disclaims any acceptance of the opinions of the authors. The paper items in this report are included in a list of 317 commodities with a "high degree of industrial concentration."

Mill Supply Men to Dine February 18

The New York Association of Dealers in Paper Mill Supplies will have their Annual Banquet this year in the East Ballroom of the Hotel Commodore on Tuesday evening, February 18, instead of on Wednesday evening in order not to conflict with the dinner of the Paper and Twine Association. Walter Martins of George W. Millar & Co., Inc., is chairman of the dinner committee and A. J. Moran is chairman of the souvenir program committee.

A. T. Hurter Joins Defence Industries

MONTREAL, P. Q., December 13, 1940 — A. T. Hurter has resigned from the Lake Sulphite Pulp Company, Ltd., and Nipigon Corporation, Ltd., and has joined the staff of Defence Industries, Ltd.

DILTS-COWLES HYDRAPULPER
The ultimate in modern pulping performance can be had only with the Hydrapulper. It will save more than half your present power costs for pulping. It will handle volume work heretofore impossible in any one or several units. Simple in construction and adaptable to practically any mill set-up, it is extremely flexible in the great variety of uses to which it may be put. In short, the Hydrapulper is the solution to every pulping problem.
This amazing unit, in conjunction with the Dilts Hydrafiner, gives a complete pulping and refining process. Actually only two moving parts — one to each unit — accomplish an unprecedented volume of work. Write today for details.
Dilts
DILTS MACHINE WORKS, Fulton, N. Y.
Division of The Black-Clawson Company, Hamilton, Ohio
DILTS HYDRAFINER
Precision-built and compact, the Hydrafiner is a high speed unit utilizing the principle of close clearances and high surface speed to produce a refined stock, different in character from that produced by any other refining equipment, retaining fibers of extraordinary length.
This wholly practical, flexible unit belongs in every paper mill. It is equally adaptable to any system of operation — continuous or batch.
In conjunction with the Dilts-Cowles Hydrapulper in specially designed Hydracycle systems, or set up to meet your own mill requirements, the Hydrafiner "delivers" with a regularity that is creating a new era in stock preparation.
Dilts
The Black-Clawson Company—Operators of Shartle Brothers and Dilts Machine Works

The November 28th issue of Paper Trade Journal, carried a section devoted to 250 Years of Papermaking in America. These letters indicate the enthusiasm of the industry for this remarkable issue.

WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE
NEW YORK CENTRAL BUILDING
NEW YORK

December 5, 1940.

Mr. George S. MacDonald
The Paper Trade Journal
15 West 47th Street
New York, N. Y.

My dear Mr. MacDonald:

I spent most of last evening reading over the current issue of The Paper Trade Journal. It is a knock-out and I want to compliment and congratulate you on producing such an interesting number.

I have it carefully laid to one side so that I can go through the whole book from end to end and thoroughly digest the most interesting articles with reference to the paper industry. I am now serving my fiftieth year with the West Virginia Pulp and Paper Company, and am quite familiar with the old timers in the paper industry.

I hope you are quite well.

Sincerely yours,

H. F. Harrison

HFH:EP

CROCKER, BURBANK & CO. Assn.

PAPER MANUFACTURERS.

Fitchburgh, Mass. December 9, 1940

Mr. Harold F. Turner
Paper Trade Journal
15 West 47th Street
New York, N. Y.

Dear Mr. Turner:

I am writing to ask you whether it would be possible for me to get hold of an extra copy of the November 28th issue of THE PAPER TRADE JOURNAL.

I think the historical section of this issue one of the most interesting compilations I have read, and I would like to have a copy of this issue for my personal library.

I should like to take this opportunity of congratulating you upon the manner in which this whole subject was treated, and to tell you that I think you have reason to be very proud of the results of your efforts.

Very truly yours,

Crocker, Burbank & Co. Assn.

Douglas Crocker
Vice President

DC/B

Anheuser-Busch, Inc.

ST. LOUIS, MO., U.S.A.

December 10, 1940

Lockwood Trade Journal Co., Inc.
15 West 47th Street
New York, N. Y.

Gentlemen:

We would like to have five copies of your November 28, 1940 issue of the PAPER TRADE JOURNAL, which contained a supplement marking the 250th anniversary of paper making in America. If you will, please send these five copies for my attention and submit your invoice to cover their cost.

This particular issue of your magazine is especially attractive and the section devoted to the history and progress of the paper industry is most impressive. You are to be very highly complimented for the most interesting outline of the paper history. It is of unlimited value to anyone who has even the slightest interest in this highly essential industry.

Very truly yours,

Harry C. Crist

Harry C. Crist, Manager
Corn Products Division

HCC/KFA

HOLLINGSWORTH & WHITNEY COMPANY
PAPER MANUFACTURERS
MOBILE, ALABAMA

CHICKASAW MILLS

December 9, 1940

Lockwood Trade Journal Co., Inc.
15 W. 47th Street
New York, N. Y.

Gentlemen:

Please send me five issues of your November 28th number. Enclosed please find my check for $5 in payment. There are five of us here at Mobile that would like to have copies of this number for our libraries.

We think you have done a splendid job in writing up the history of 250 years of paper-making in America, and your article on the Hollingsworth & Whitney mill at Mobile is very well arranged.

Very truly yours,

James L. Madden

Assistant Treasurer

PC
Enc.

This Historical Record of 250 Years of Papermaking in America from 1690 to 1940 is now available, bound in cloth, suitably illustrated, at a price of $3.50 per copy. The edition is limited and those desiring these copies for permanent records must act quickly to reserve their copies. Mail your order and check to

LOCKWOOD TRADE JOURNAL COMPANY, INC.

15 West 47th St. **New York City, N. Y.**

Clarifies National Container Decree

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., December 18, 1940—The Department of Justice has issued the following statement in connection with the consent decree entered, on April 23, 1940, in the case of United States v. National Container Association, et al.:

The Department's attention has been called to misinterpretations of this decree designed to encourage practices open to question under the anti-trust laws in the erroneous belief that such practices have been specifically sanctioned by the decree. To remove the possibility of such misinterpretations in the future the Department is making public this clarification of policy:

An equity decree may (and often does) enjoin, not only the precise conspiracy complained of, but conspiracies of like character and the use of devices which are subject to abuses similar to the abuses specified in the complaint. The extent to which such similarities should be made the basis for injunction is a matter of judgment in each particular case. Activities which are not directly involved in an unlawful conspiracy may be enjoined as intimately related to the conspiracy or may be omitted from the injunction as of remote or uncertain relation thereto. If such activities are not enjoined, they may remain unmentioned in the decree or they may be specifically mentioned in order to make clear that they are not covered by injunctive provisions directed against other activities. Thus the exact boundaries of the injunction may be defined both by inclusion and by exclusion.

But any such practice, unmentioned or specifically excluded from an injunction, unless affirmatively sanctioned by other terms of the decree, bears the same relation to the antitrust laws as it did before the decree was entered. The Court acquires no jurisdiction over it by virtue of its decree. Thus, not being enjoined, defendants who engage in such activities as a part of a conspiracy to restrain trade do not thereby render themselves liable to contempt proceedings for violating the terms of the decree unless such activities contribute to a violation of the express prohibitions of the decree. Such activities would, nevertheless, invite criminal or civil action under the antitrust laws. No cloak of protection having been thrown around any such practice, all persons engaging therein, including defendants, would be subject to prosecution if violations of law result.

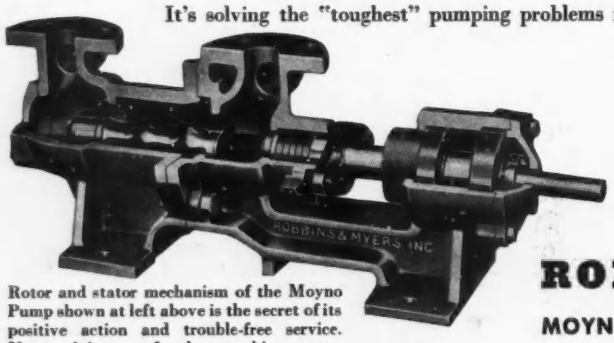
Failure to understand these characteristics of an injunctive decree appears to be responsible for misinterpretation of the Container decree. After forbidding a variety of practices which were intimately related to the conspiracy alleged in the suit against the National Container Association, et al, this decree specifies that certain other activities are not prohibited by the decree. It does not, however, authorize or require that these activities be undertaken. Anyone engaging in them, in the Container industry or elsewhere, is, as before the decree, subject to proceedings under the antitrust laws if he should engage in such activities as a part of a conspiracy or concert of action to restrain trade in violation of those laws.

Here's **YOUR** *Solution to "Pumping Troubles"* ═══

R & M MOYNO PUMP

Efficient, uniform handling of heavy liquids, including size, coating and stock . . . trouble-free service . . . reduced power and maintenance costs . . . improved paper quality! These are the time and money saving advantages you get in the new R & M Moyno Pump.

It's solving the "toughest" pumping problems in leading paper mills . . . giving day-after-day time and money-saving performance . . . speeding production.



Rotor and stator mechanism of the Moyno Pump shown at left above is the secret of its positive action and trouble-free service. Note minimum of other working parts.

UNIFORM, METERED DELIVERY

The patented principle of a single-thread helical rotor revolving within a double-threaded helical stator provides positive displacement, forces liquids gently forward and with metered uniformity. There are no valves or pistons to stick, leak, clog or wear out.

An R & M Moyno Pump can solve *your* toughest pumping problem. Let our field experts show you how, without obligation on your part. Write today for R & M Moyno Pump Folder No. 1777.

ROBBINS & MYERS • Inc.

MOYNO PUMP DIVISION SPRINGFIELD, OHIO

Sulphite and Groundwood at TAPPI Annual Meeting

Two important sessions at the annual meeting of the Technical Association of the Pulp and Paper Industry to be held at the Roosevelt Hotel, New York, N. Y., on February 17-20, 1941, will be sponsored by the Acid Pulping Committee and the Mechanical Pulping Committee of which H. A. DuBois of the Kimberly-Clark Corporation and Lyman Beeman of the St. Regis Paper Company are chairmen, respectively.

Following are some of the papers to be presented at the Sulphite (Acid Pulping) Session:

1. "The Twelve Knife Chipper" by N. P. Wardwell, Carthage Machine Company, Carthage, N. Y.
2. "Experiments in Pulping Douglas Fir by the Acid Sulphite Process" by G. H. Chidester and J. N. McGovern, Forest Products Laboratory, Madison, Wis.
3. "Comparison of Soda-Base and Calcium-Base Cooking Acids in the Preparation of Sulphite Pulps From Mixtures of Spruce and Fir" by M. O. Schur, Brown Company, Berlin, N. H.
4. "Sulphite Liquor Treatment" by Guy Howard, Marathon Paper Mills Company, Rothschild, Wis.
5. "The Equilibrium Relations Between Sulphur Dioxide and the Cooking Acid Solutions in the Milk of Lime System" by R. P. Whitney, Massachusetts Institute of Technology, Cambridge, Mass.

The papers to be presented in the Groundwood (Mechanical Pulping) Session are the following:

1. "Refining of Tailings" by Anton J. Haug, Nashua, N. H.
2. "The Trimbey-Walker Whirlpool Riffler" by E. J. Trimbey, Trimbey Machine Company, Glens Falls, N. Y.
3. "The Roberts Grinder" by A. E. Bartlett, Algonquin Paper Company, Ogdensburg, N. Y.
4. "Drainage Resistance of Groundwood Pulp" by W. O. Hisey, New York State College of Forestry, Syracuse, N. Y.

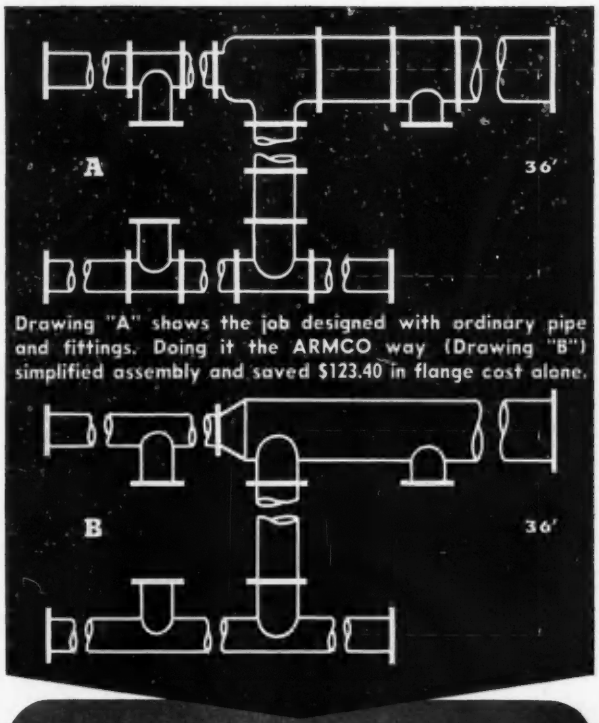
Buys Paper Under Walsh-Healey Act

WASHINGTON, D. C., December 18, 1940—During the week ended November 30, the Government purchased $63,095.66 worth of paper and allied products under the Walsh-Healey Act as follows: $10,860.00 worth of toilet paper for War, QMC, from Miller Paper Company, Louisville, Ky.; $11,280.00 worth paper napkins for Veterans Administration from Chas. G. Stott & Co., Inc., Washington, D. C.; $21,455.66 worth of mimeograph paper for War, QMC, from Perkins-Goodwin Company, New York City; and $19,500.00 worth of toilet paper for War, QMC, from Blake, Moffitt & Towne, San Francisco, Calif.

Johannes Westergaard Makes Change

Johannes Westergaard, who has been vice-president of Atterbury Brothers, Inc., New York, for a number of years, has resigned to become vice-president of Castle & Overton, Inc., New York, on January 1.

Mr. Westergaard was recently reelected president of the Association of American Wood Pulp Importers and is well known to the paper mills throughout the United States.



Drawing "A" shows the job designed with ordinary pipe and fittings. Doing it the ARMCO way (Drawing "B") simplified assembly and saved $123.40 in flange cost alone.

Mill Pockets $123.40 ON THIS PIPING JOB

At least $123.40 was saved on this piping job by designing it the low-cost ARMCO way. Wouldn't you be interested in saving this much or more on a similar job?

Every foot of ARMCO Spiral Welded Pipe is pre-fabricated to fit your job. Fittings come welded to straight pipe runs. This means fewer flanges and fewer joints.

Once installed, ARMCO Pipe invariably gives trouble-free service. It is strong, smooth inside for high flow capacity, and has no threads to invite corrosion. The fewer joints mean less chance for costly leaks.

Save money and increase efficiency on your next job by using ARMCO Spiral Welded Pipe. Diameters range from 6 to 36 inches, wall thicknesses from 7/64 to ½-inch with optional coatings and linings. Just send us your plans and specifications and we'll submit prices and a sketch of our proposed design. The American Rolling Mill Company, Pipe Sales Division, 2971 Curtis Street, Middletown, Ohio.

ARMCO

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SPIRAL WELDED PIPE

N. P. T. A. Awards Grand Prizes

The National Paper Trade Association announces the grand prize awards in the "Get out the vote campaign" as follows:

First prize—M. Ralph Schafer, Beecher, Peck & Lewis, Detroit, Mich.

Second prize—S. R. Spencer, Spokane Paper and Stationery Company, Spokane, Wash.

Third prize — L. H. Morgan, Andrews Paper House of York, York, Pa.

Fourth prize — O. F. Hamilton, Jr., Hamilton Paper Corporation, Richmond, Va.

Fifth prize—L. Nack, A. E. MacAdam & Co., Inc., Brooklyn, N. Y.

Sixth To Tenth Prize Winners: W. M. Rohlfs, Terminal Paper Company, Philadelphia, Pa.; R. S. Moore, Mayer Myers Paper Company, Memphis, Tenn.; H. M. Cruse, Crescent Paper Company, Indianapolis, Ind.; F. F. Ibsch, Southwestern Paper Company, Houston, Texas; L. W. Knoblach, Lehigh Valley Paper House, Allentown, Pa.

Eleventh To Twentieth Prize Winners: Don Van Ostenberg, Beecher, Peck & Lewis, Detroit, Mich.; R. R. Murphy, Peterson Paper Company, Davenport, Iowa; A. H. Whitley, Jr., Parker Paper Company, High Point, N. C.; C. H. Gravett, The Scioto Paper Company, Columbus, Ohio; I. C. Eagon, The Hanlon Paper Company, Barnesville, Ohio; Joseph Herbst, John C. Streibich Company, Peoria, Ill.; W. S. Knox, Knox & Schneider, Chicago, Ill.; Ernest Lieben, Yorkville Paper Company, New York, N. Y.; D. L. Jones, Roach Paper Company, Little Rock, Ark.; C. A. Willemin, The Weissinger Paper Company, Lansing, Mich.

Honorable Mention: M. C. Baldwin, Standard Paper Company, Kansas City, Mo.; R. N. Benham, Wilcox - Mosher - Leffholm Company, Minneapolis, Minn.; R. M. Bowers, Mayer Myers Paper Company, Memphis, Tenn.; W. H. Carey, Crescent Paper Company, Indianapolis, Indiana; R. L. Clark, A. E. MacAdam & Co., Inc., Brooklyn, N. Y.; Gordon DeBerg, Spokane Paper and Stationery Company, Spokane, Wash.; J. Dwire, Stone & Forsyth Company, Boston, Mass.; Murray Emanuel, Yorkville Paper Company, New York, N. Y.; A. F. Harder, Knox & Schneider, Chicago, Ill.; A. G. Heinmiller, American Paper Company, Milwaukee, Wis.; A. C. Iobst, Lehigh Valley Paper House, Allentown, Pa.; A. J. Klein, Wilder Brothers Company, Philadelphia, Pa.; C. R. Sawyer, Premier Paper Company, Louisville, Ky.; W. H. Watt, Enterprise Paper Company, Philadelphia, Pa.; H. T. Willette, Wilcox-Mosher-Leffholm Company, Minneapolis, Minn.

Many fine ideas were sent in in answer to these questions and in order that the members and their salesmen may profit from these ideas as well as from the answers to the weekly questions, a Sales Manual is being prepared by the National Association incorporating these winning answers. The Sales Manual will be made available to the membership within the next few weeks.

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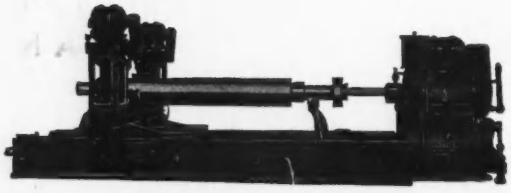
Point-by-point, more than 70 different paper mills carefully compared the LOBDELL Roll Grinder with other leading grinders . . . And chose it for its simplicity of design—rigid construction—exclusive operating advantages. Investigate! — see why many have called it the most rapid and accurate grinder yet produced! Details on request.



LOBDELL

A Product of the LOBDELL CAR WHEEL COMPANY, Wilmington, Delaware
"Makers of Quality Paper Mill Machinery"

Roll Grinder

Indianapolis Stocks Low

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., December 16, 1940 — A fairly good level continues to be seen in the paper demand from this territory. Miserable weather in the last week served to cut demand slightly, but this is a temporary thing and the jobbers are not alarmed and believe business will pick up immediately with more favorable conditions.

The trade is getting ready for inventory period and stocks in most houses have been reduced to a fairly low level. Rather extensive buying is expected after the inventory period, though there are some who will cling to the hand-to-mouth policy they have followed for some time.

Demand for kraft paper continues heavy, due largely to the holiday season. Bags and wrapping papers all are moving nicely with the big rush yet to come. The volume is considerably ahead of last year and the trade is well pleased. Tissues continued to move in good volume last week.

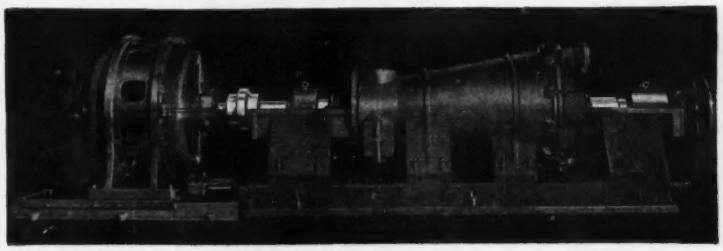
Demand for ledgers, books and covers continued fair last week with prices firm. Local printers have an average volume of work on hand and report improved prospects after the first of the year.

The box demand continues good with local factories working nearly to capacity and in some instances behind with their orders. A widening base is indicated due to increasing demand from industries who are participating in the national defense program, but the regular trade has been good for some weeks. Warehouse stocks are not large and will be kept at a low point until inventory.

Demand for building paper and roofing slumped slightly during the week due largely to weather conditions, which hampered construction nearly the entire week. Cold has not hindered building as yet and a lot of work remains to be completed before cold weather.

Local executives report a continued fair demand for rags with most of the demand for better grades. Prices show no change, but in some grades appears weak. Lower grades of paper stock are moving in good volume but other grades are comparatively quite. No price changes.

APPLETON JORDANS



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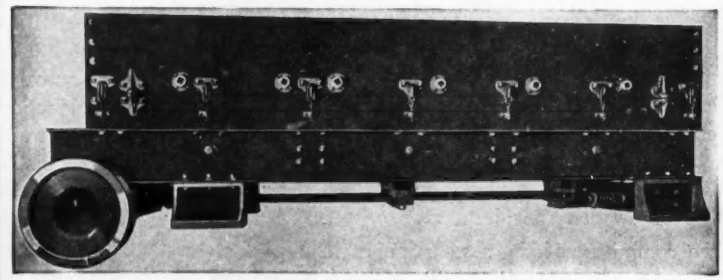

APPLETON-WAGNER FLAT SCREEN

THE APPLETON MACHINE COMPANY • Appleton, Wisconsin

Brotherhood Meets at Watertown

WATERTOWN, N. Y., December 16, 1940—The annual meeting of the Northern New York District Council of International Brotherhood of Pulp, Sulphite and Paper Mill Workers was held here early last week and resulted in the re-election of Ralph G. O'Marrah as president. Delegates from Harrisville, Carthage, West Carthage, and Herrings were present at the meeting. Frank L. Callahan was elected first vice-president to succeed Ernest Noakes, of Dexter. Other officers elected included Mary McKenzie, of Carthage, second vice-president; Bernard J. Trippany, of Norfolk, third vice-president; George H. Dale, Dexter, fourth vice-president; Estelle Paul, Carthage, recording secretary; Mrs. Charles F. Ward, Watertown, financial secretary; and Hollis L. Hatley, Norfolk, treasurer. Jacob Stepan, general representative, spoke briefly.

PAPER TRADE JOURNAL
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Henry J. Berger
EDITOR

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COMING EVENTS IN PAPER INDUSTRY

AMERICAN PAPER AND PULP ASSOCIATION, Sixty-fourth Annual Convention and meeting, Waldorf-Astoria Hotel, New York, February 17-21.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Convention, Roosevelt Hotel, New York, February 17-20.

SALESMEN'S ASSOCIATION OF THE PAPER INDUSTRY, Annual Meeting and Luncheon, Waldorf-Astoria Hotel, New York, Tuesday, February 18.

NATIONAL PAPER TRADE ASSOCIATION OF THE UNITED STATES, Convention, Waldorf-Astoria Hotel, New York, February 17-20.

THE NEW YORK ASSOCIATION OF DEALERS IN PAPER MILLS' SUPPLIES, Annual Banquet, Commodore Hotel, New York, Tuesday, February 18.

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

SOARING PRICES UNLIKELY

Many phases of the national economy were discussed at the Congress of Industry sponsored by the National Association of Manufacturers, held in New York last week. The keynote of the annual meeting of leading industrial leaders was, of course, national defense, and how industry can and should cooperate to most fully insure its success without unnecessary delay. The question of inflation and soaring prices was given serious consideration.

The committee of the association in its report on production, prices, and credit, stated its general principles in part as follows: "In the interest both of conducting the defense program on the most economical basis and to facilitate readjustments which must be made after the end of the defense program, industry should make every effort to keep costs, prices and profits within reasonable levels. Installment credit has become one of the sustaining forces of business conditions. At the present time, however, with the prospective rise in individual earnings, installment credit is likely to assume considerable proportions. For example in 1937, the latest year for which figures are available, the amount of consumer credit outstanding was greater than in 1929. This would mean also that demand for consumer goods will compete, for productive facilities, with the demand for defense goods. This situation leads to bottlenecks and, at the end of the armament program, might mortgage so much of current income as to leave insufficient funds available for the then needed expansion of peace-time production."

Continuing, the report said: "In a number of ways installment credit can be kept within reasonable limits without serious hardship; more severe restrictions could be placed upon the discounting of installment paper and other forms of consumer financing by banks. Provision could be made for larger cash down payments. The terms of installment contracts could be restricted to shorter periods. Non-defense industries should avoid expansion of plant facilities on the basis of 'prosperity' orders, since these are frequently deceptive, because they involve the pyramiding of orders of the same quantity from different producers. To be economically beneficial, plant expansion should take into account such factors as existing facilities in the industry, expansion already under way and the normal demand curve of the company. Scientific research should be maintained and increased to bring about lowered production costs and the development of new products when the armament period is over."

In touching upon the increase in individual debts the report said: "To avoid the creation of bottlenecks and undue increase in prices as a result of competitive bidding by the various agencies of government, careful consideration should be given to the wisdom of consolidating in one government procurement agency purchases of materials used by more than one branch of the government. An undue increase in individual or business debts during a period of increased business activity based upon armament production will greatly increase the difficulties of orderly transition to subsequent peace-time production. This is particularly true if the debts are incurred on a basis of inflated prices, values, and credit. Business organizations should endeavor to take all practicable steps to create and maintain capital structures which provide a relationship between fixed charges and income that will not jeopardize survival through any subsequent period of depression. To facilitate the flow of investment into productive enterprise, the Securities Act should be constructively amended. Public policies, particularly in the field of taxation, should be formulated with a view of encouraging greater use of equity or venture capital."

Expressing doubt that the soaring price period of 1918-1922 is not likely to be repeated in the future, Commissioner Leon Henderson of SEC and Deputy Commissioner Hamm, believe that control efforts will be maintained even under defense spending. Mr. Hamm said recently that, "To keep prices stable, the chief thing is to ensure an adequate supply. To do that you must first have advance notice of requirements. So we are for anything which increases supply. This brings us to the conclusion that the essential factor in keeping down defense costs is

the expansion of production and facilities for production. Even if such expansion leaves you with surplus plant facilities after the war is over, it may still have saved you money. Bernard Baruch told the Nye Committee that from 13 to 15 billions of dollars could have been saved during the last war if prices could have been stabilized."

In commenting briefly on regulation of prices Mr. Hamm said: "Fixing prices, however, is a headache. We learned that under the NRA. It costs time and money and even then you are nearly always a few jumps behind the business man who has been devoting a lifetime to his particular commodity. We have certain powers already which could be invoked to regulate prices if we have to and we could ask Congress for more. But, unless an actual war emergency arises, we feel we should be able to go along on our present basis without employing such means. No group of price stabilizers ever had a stronger ally than we have in American business today. Business learned a lot during the last war and after it. It learned that what goes up must come down. Even with prices only 80 per cent of the 1926 level technological advance has put adequate profits within reach of the business man. Then there is the fact that the present price level is adjusted for some 60 per cent of capacity. At 100 per cent of capacity profits can multiply without raising prices at all."

In referring to the paper industry, Mr. Hamm continued, "Rumor is at the bottom of many increases. We have a system of voluntary preferences, not legal priorities. We see that there is a steady flow of materials to the industries in most need of them. We make use of publicity. By such means we ironed out a threatened rise in pulp and paper costs. While we have idle men and idle capacity to absorb we do not see why prices should rise and we are encouraging expansion of facilities to ensure that they shall not rise in the future. If necessary we can invoke other powers. In the last analysis there are the tariff and price control."

Pittsburgh Firm Signs Stipulation

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., December 18, 1940—National Labor Relations Board has announced a stipulation agreement in settlement of its February 16, 1940 order against Pittsburgh Standard Envelope Company, Pittsburgh, Pa.

Under the terms of the settlement the company shall not discourage membership in Pittsburgh Printing Pressmen and Assistants Union No. 64, (AFL).

The company is required to reinstate four employees and pay them $3,500 for loss of pay they suffered by their respective discharges.

Under the terms of the stipulation the company is to post notices for at least 60 days stating that it will not engage in unfair labor practices, and provision is made for the entry of a consent decree by the United States Circuit Court of Appeals enforcing the Board's order.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1940	1939	1938	1937	1936	1935	1934
January	90.2%	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	86.2%	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	83.9%	84.0%	69.6%	90.3%	76.0%	70.5%	.....
April	86.3%	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	91.8%	80.2%	69.0%	90.6%	81.6%	69.4%	.....
June	93.8%	79.7%	66.0%	87.3%	80.7%	72.3%	.....
July	87.1%	75.2%	72.0%	81.8%	77.3%	64.9%	.....
August	87.2%	82.9%	77.2%	82.9%	81.5%	70.9%	.....
September	83.2%	88.7%	76.3%	78.6%	80.5%	71.9%	58.2%
October	88.0%	96.6%	82.5%	73.5%	87.6%	75.6%	64.7%
November	87.0%	97.2%	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	91.1%	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average	.....	84.9%	72.3%	80.6%	81.3%	70.5%	.....
First 49 weeks	87.8%	84.6%	72.3%	82.5%	81.3%	70.6%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS, 1940		CORRESPONDING WEEKS, 1939	
November 2	88.3%	November 4	98.0%
November 9	87.8%	November 11	98.1%
November 16	87.4%	November 18	98.4%
November 23	86.7%	November 25	96.2%
November 30	86.1%	December 2	95.1%
*December 7	87.2%	December 9	96.6%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Nov. 2, 1940	Nov. 9, 1940	Nov. 16, 1940	Nov. 23, 1940	Nov. 30, 1940	Dec. 7, 1940
0% to 50%	46	51	56	50	56	37
51% to 100%	249	243	233	241	222	202
Total Mills Reporting	295	294	289	291	278	239

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	64%	67%	63%
1940	71%	70%	69%	70%	76%	79%	72%

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%
1939	72%	74%	84%	81%	71%	70%
1940	74%	72%	79%	77%	....	....

Week end. Nov. 2, 1940—80%
Week end. Nov. 9, 1940—78%
Week end. Nov. 16, 1940—77%
Week end. Nov. 23, 1940—77%
Week end. Nov. 30, 1940—76%
Week end. Dec. 7, 1940—78%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

* Preliminary figure.

Oji Paper Co. Curtails

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., December 11, 1940—Oji Paper Company, largest manufacturer in Japan, has announced that a further drastic curtailment in production became necessary from July 1, due to increasing shortages of caustic soda and bleaching powder.

Faulty distribution methods are blamed by some representatives of the printing trades for the acute paper shortage. Sole distribution rights rest with paper dealers and quotas are determined on the basis of actual past orders. According to recent press comments, printing firms are unable to secure paper supplies because certain dealers are taking advantage of opportunities for exhorbitant profits by diverting their goods to the illegal "black market." Some dealers are accused of setting up envelope factories and paper goods factories of their own, utilizing paper supplies in these enterprises.

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*Trade-mark of American Cyanamid & Chemical Corporation applied to wetting agents of its own manufacture.

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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Sulphate Pulping of Western White Pine (*Pinus Monticola*)*

By J. Stanley Martin[1] and Mark W. Bray[2]

Abstract

A study has been made of the pulping qualities of western white pine (Pinus monticola). *In general, this species is readily reduced by the sulphate process for the production of strong and bleachable pulps of comparatively high yield and fairly satisfactory physical properties. While some of the strength properties of the pulps are slightly inferior to the average commercial product, the fibers possess excellent tensile strength and good felting quality.*

Prompted by the relatively large amount of western white pine logging and mill waste, its ability of reproduction, and by the fact that the literature contains very little information regarding its suitability for pulping, the Forest Products Laboratory[3], in cooperation with the Northern Rocky Mountain Forest and Range Experiment Station, undertook to evaluate the species and to study its pulping characteristics.

This species, frequently known as Idaho white pine, is an important timber tree of the northwestern part of the United States, with the heaviest stands occurring in northern Idaho and adjacent parts of Montana and Washington.

TABLE I.—COMPOSITION OF STAND

Species present	Average age Years	Average D.B.H. Inches	Minimum D.B.H. Inches	Trees per acre Number	Trees per acre %
Western white pine..	60-80	6.7	2	420	50
Western larch	60-80	12.7	10	70	8
Western hemlock....	40-60	2.6	1	200	23
Western red cedar..	40-60	2.4	1	120	14
Engelmann spruce...	60-80	3.6	2	30	4
Douglas fir	60-80	5.0	5	10	1

The work herein reported, although limited in its scope, serves to give a general idea of the physical and chemical properties of the wood selected from the top, middle, and butt portions of two typical second-growth trees, and results obtained through the application of two commercial pulping processes, the soda and the sulphate.

Wood Used

The material used consisted of top, middle, and butt sections, taken from two trees, which were obtained from a typical stand in the Priest River Experimental Forest, Bonner County, Idaho. The stand was located in mountainous territory and had been severely burned over at about the year 1850. The composition of the stand showed that 50% of the trees were western white pine; other species were present in decreasing amounts as shown in Table I.

The wood consisted of three bolts four feet in

TABLE II.—PHYSICAL PROPERTIES OF WESTERN WHITE PINE AND EASTERN WHITE PINE PULPWOOD

Species	Shipment	Tree and log	Log data: Height of base above stump, feet	Log data: Knots less than 1 inch diameter,[1] number	Disk data: Diameter, inches	Age, years	Rate of growth, rings per inch	Specific gravity (Moisture-free weight / Green volume)	Density Lb. per cu. ft.	Dryness of the wood, %	Proportion by volume: Heartwood, %	Proportion by volume: Mild compression wood,[2] %	Bark: By moisture-free weight, %	Bark: By green volume, %
Western white pine....	1526	A-1[3]	0	25	8.5	68	16.1	0.396	24.7	55.4	65	13	11.1	9.3
		A-2	20	5	6.5	48	14.8	0.384	24.0	49.9	47	0	8.2	9.5
		A-3	40	10	4.2	34	16.2	0.400	25.0	45.4	30	0	11.6	14.2
		B-1	0	14	7.5	62	16.4	0.349	21.8	51.6	66	20	7.6	9.1
		B-2	20	9	6.0	43	14.4	0.345	21.5	49.6	57	16	7.3	9.7
		B-3	40	16	3.7	28	15.0	0.358	22.4	41.8	25	29	9.8	12.6
Eastern white pine....	1330	(4)	..	..	7.0	23	6.6	0.303	18.9	38.5	43	..	8.2	6.9

[1] No knots larger than 1 inch.
[2] Pronounced compression wood absent.
[3] The disk from bolt A-1 contained a small amount of a brown fungous infection.
[4] Averages for eight logs selected at random from a total of 65 comprising a sample cord of eastern white pine.

---

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Olympic Hotel, Seattle, Wash., Aug. 20-23, 1940.
[1] Member TAPPI, Associate Engineer, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, Madison, Wis.
[2] Member TAPPI, Senior Chemist, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, Madison, Wis.
[3] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

TABLE III.—COLOR ANALYSIS OF WESTERN WHITE PINE AND EASTERN WHITE PINE PULPWOOD
(Average of all logs comprising the shipment)

Species	Shipment	Material	Ives readings			Color analysis from Ives readings				
							Primary hue		Secondary hue	
			Red %	Green %	Blue %	White %	Tint	Luminosity %	Tint	Luminosity %
Western white pine.....	1526	sapwood	72	56	45	45	orange	10.2	yellow	2.7
		heartwood	73	57	45	45	orange	10.2	yellow	3.6
Eastern white pine.....	1330	(1)	67	50	38	38	orange	10.9	yellow	3.2

[1] Average of both heartwood and sapwood.

length from each of two trees. The first bolt was cut from the stump, the second 20 feet above the stump, and the third 40 feet above the stump. The bolts from these locations were considered to typify butt, middle, and top material, respectively.

Physical and Chemical Evaluation

The physical properties of the top, middle, and butt portions of each tree are shown in Table II. The data show that the densities and growth rates of the wood from the different elevations in the trees vary only slightly, but the proportion of heartwood decreases decidedly with increase in elevation. The wood of tree A is appreciably higher in density than that of tree B. Both trees had numerous small knots less than one inch in diameter with the smallest number occurring in the middle part of the trees. In addition to the western white pine data, evaluation data on a shipment of eastern white pine *(Pinus strobus)* are also included in the last line of Table II for comparison. The data on eastern white pine indimate much faster growth and lower density than either of the two western white pine trees.

As shown in Table III, the color of the heartwood and the sapwood of western white pine is practically the same.

TABLE IV.—CHEMICAL ANALYSIS OF WESTERN WHITE PINE AND EASTERN WHITE PINE PULPWOOD

Constituent	Height of sample logs above stump [1]			Western [2] white pine	Eastern [3] white pine
	0-4 feet %	20-24 feet %	40-44 feet %	%	%
Cellulose	60.4	61.7	61.1	59.7	60.0
Alpha-cellulose	41.7	42.2	41.2	38.6	44.0
Lignin	25.1	24.7	24.6	26.4	27.5
Total pentosans	9.6	11.0	11.5	7.0	10.6
Pentosans in cellulose.....	8.5	8.1	9.8	...	...
Solubility in—					
Hot 1% sodium hydroxide solution	12.8	10.5	11.4	14.8	16.2
Hot water	3.6	3.2	3.3	4.5	4.6
Alcohol-benzene	4.0	3.2	3.1	...	6.9
Ether	2.1	1.3	1.5	4.3	3.0

[1] Chips from logs at corresponding heights in trees A and B were mixed, shipment 1526.
[2] Reported by Ritter and Fleck, Ind. Eng. Chem. 14, no. 10: 933 (October, 1922). No record as to height in tree.
[3] Sample an average of several logs selected at random from shipment 1330.

Since the chemical data (Table IV) were obtained on mixed samples from the same portions of the two trees, they may be considered as average values and representative of the material used for pulping. Little difference in chemical properties between top, middle, and butt portions of the trees is indicated. However, the slightly lower total cellulose content coupled with a little higher percentage of extractives in the butt logs may be indicative of a lower yield of pulp from the lower part of the trees. Chemical analysis of a shipment of western white pine made a number of years ago shows a lower pentosan value and a higher content of lignin and extractives than does the present shipment. An analysis of eastern white pine is included in Table IV for comparison. It contains more extractives than does western white pine and also has a higher content of alpha-cellulose.

Preparation of Wood for Pulping

The four-foot bolts from each of the three elevations in the two trees were hand-peeled and separately converted into 5/8-inch chips, which were screened to remove sawdust, slivers, and oversized knots. The chips from the same location in both trees were thoroughly mixed and stored in separate cans. Thus material representative of top, middle, and butt sections was pulped separately. Just prior to pulping, the chips were sampled for their moisture content.

Pulping Experiments

Except for the top bolts, where insufficient material was available, all digestions were made in triplicate under identical conditions in globe-type, rotary autoclaves of 0.5 cubic foot (3.7 gallons) capacity. The autoclaves, heated with indirect steam, were rotated at the rate of one r.p.m. throughout the entire cooking operation.

A predetermined linear temperature - pressure schedule was followed in cooking, allowing 1.5 hours to raise the temperature of the autoclaves from that of the room to maximum temperature, 170 deg. C., where, in the case of the sulphate digestions, it was held for an equal period and in the case of the soda digestions it was held for 0.5 hour longer, making the total cooking cycles three and 3.5 hours, respectively.

The equivalent of four pounds of moisture-free chips was used for each digestion. The moisture content of the chips was included in calculating the liquor volumes.

For the sulphate digestions, the chips were cooked with a total of 20% of their weight (moisture free) of a mixture of sodium hydroxide and sodium sulphate in the ratio of two parts by weight of the former to one part of the latter. Thus the total sodium oxide content of the liquors was 15.63 pounds per hundred pounds of moisture-free wood, and the total effective alkali calculated as sodium hydroxide was 16.75 pounds. The total initial concentration of chemicals in the cooking liquor, including wood moisture, was 50 grams per liter.

The soda digestions were made with 25 pounds of sodium hydroxide per hundred pounds of moisture-free chips at a concentration of 60 grams per liter.

Upon completion of the digestion operation, the autoclaves were immediately cooled and the contents dumped into screen boxes for washing. The pulps were then broken up by rapid agitation in water suspension, screened through a 12-cut diaphragm screen, pressed to remove excess moisture, and sampled for their moisture content. So as to have sufficient material for duplicate physical tests, the three similar digestions were mixed and stored in airtight cans until tested.

The results of the pulping experiments, including the chemical and physical properties and bleach requirement of the pulps, are reported in Table V.

Since the wood cooked by the sulphate process

consisted of the top, middle, and butt material, the results obtained afford a comparison not only between pulps from wood representing different parts of the tree but also between pulps made from one section of the tree (middle portion) by two different methods of cooking, the sulphate and the soda.

Sulphate Process

There was a definite increase in total yield of sulphate pulp in proceeding from the butt to the top of the tree, but since the screenings were nearly the same regardless of position of bolt, the variation therefore was due to differences in the screened yield. The most favorable yield of screened pulp (49.9%) was obtained from the upper portions of the trees, the middle logs showing a decrease of 1%, and the butt logs a further decrease of 3%. The small difference observed in the chemical properties of the wood from the different elevations in the trees was not indicative of such a wide spread in pulp yield. The top logs consumed a little more chemical than the middle and butt bolts, which consumed approximately equal quantities.

The color of all the unbleached pulps was nearly the same, while that of the pulps bleached by a single-stage treatment was the lowest for those prepared from the top logs. The bleaching tests indicate that the middle logs would be the best for bleaching purposes, with those from the butt portion following next in order.

Another measure of the bleaching properties of the pulps, the Roe chlorine number, was also favorable to the pulp from the middle portion of the tree.

Chemical analysis of the unbleached pulps showed that both the pentosans and the lignin increased with increased elevation in the tree. The average lignin content of the pulps is a little lower than is normally obtained from commercial sulphate pulps cooked under similar conditions. From the standpoint of purity of the sulphate pulp, the advantage shown by western white pine over some commercial species in lignin removal would be offset by their lower cellulose content. The total- and alpha-cellulose contents

TABLE V.—PULPING OF WESTERN WHITE PINE (PINUS MONTICOLA) BY THE ALKALINE PROCESSES

(Shipment 1526)

Digestion designation	Cooking and yield data: Wood: Moisture, %	Wood: Weight: Moist, lb.	Wood: Weight: Moisture-free, lb.	Chemicals: Charged: Concentration: NaOH, g./l.	Concentration: NaS, g./l.	Concentration: Total, g./l.	Concentration: Total effective alkali as NaOH, g./l.	Per 100 lb. of moisture-free wood: NaOH, lb.	NaS, lb.	Total, lb.	Total effective alkali as NaOH, lb.	Volume, gal.	Consumed: Ratio of combined to total alkali, %	Consumed: On moisture-free wood, %	Consumed: Total effective alkali as NaOH, %	Black liquor: Density at 15 deg. C., deg. B.	Black liquor: Total solids, %	Black liquor: Heat value of moisture-free residue, B.t.u./lb.	Duration at maximum temperature 170 deg. C., hours	Yield moisture-free pulp: Screened, %	Screenings, %	Total, %
1135	55.4	8.41	3.75	33.33	16.67	50.0	41.88	13.33	6.67	20.0	16.75	48.0	83.8	16.8	14.0	10.7	15.5	6874	1.5	49.6	0.2	49.8
1136						(top logs)							84.7	16.9	14.2	10.5				50.1	0.4	50.5
(Average													84.3	16.9	14.1	10.6				49.9	0.3	50.2)
1137													82.8	16.6	13.9	10.5				49.6	0.5	50.1
1138	49.6	7.94	4.00	33.33	16.67	50.0	41.88	13.33	6.67	20.0	16.75	48.0	81.9	16.4	13.7	10.8	15.5	6831	1.5	48.2	0.3	48.5
1139						(middle logs)							82.3	16.5	13.8	10.6				48.5	0.3	48.8
(Average													82.3	16.5	13.8	10.6				48.8	0.4	49.1)
1140													82.8	16.6	13.9	10.7				46.0	0.6	46.6
1141	42.2	6.92	4.00	33.33	16.67	50.0	41.88	13.33	6.67	20.0	16.75	48.0	82.3	16.5	13.8	10.7	15.6	6835	1.5	45.3	0.5	45.8
1142						(butt logs)							82.8	16.6	13.9	10.7				45.7	0.7	46.4
(Average													82.6	16.6	13.9	10.7				45.7	0.6	46.3)
1178													68.3	17.1	17.1	12.0				46.9	0.1	47.0
1179	50.6	8.10	4.00	60.00	0	60.0	60.00	25.00	0	25.0	25.00	50.0	69.0	17.3	17.3	12.0	16.0	6555	2.0	46.6	0.1	46.7
1180						(middle logs—soda)							68.7	17.2	17.2	12.0				47.3	0.0	47.3
(Average													68.7	17.2	17.2	12.0				46.9	0.1	47.0)

Test beater strength data on unbleached pulps
Tests made at 72 deg. F. and 65 per cent relative humidity

Digestion designation	Time of treatment	Freeness (Schopper): (1)	Freeness (Schopper): (2)	Ream weight 25x40-500: (1)	Ream weight 25x40-500: (2)	Burst factor: (1)	Burst factor: (2)	Tear factor: (1)	Tear factor: (2)	Tensile strength: (1)	Tensile strength: (2)	Solid fraction: (1)	Solid fraction: (2)	Stretch: (1)	Stretch: (2)
	min.	cc.	cc.	lb.	lb.	Pts. per lb. per ream		Pts. per lb. per ream		lb. per sq. in.		ratio	ratio	%	%
	0	870	...	58.0	...	0.27	...	2.4	..	1,455	.....	0.29	...	4.5	..
	20	845	845	56.7	56.1	.95	1.01	2.2	2.1	5,290	5,510	.39	0.38	5.5	5.5
1135	40	770	765	55.1	54.8	1.30	1.27	1.9	1.8	7,320	8,650	.49	.49	6.0	5.0
1136	60	625	630	54.3	55.3	1.42	1.38	1.4	1.5	11,380	10,230	.52	.52	6.0	5.8
	80	450	455	52.6	52.9	1.33	1.35	1.2	1.3	11,600	12,600	.58	.58	6.5	6.8
	100	300	305	56.1	50.7	1.34	1.31	1.0	1.0	12,700	13,030	.62	.61	7.0	8.0
	0	870	...	58.6	...	.29	...	2.7	..	1,462	.....	.27	...	4.0	..
	20	845	845	57.5	57.6	.93	.96	2.7	2.2	5,660	5,320	.39	.39	7.0	5.8
1137	40	775	775	56.4	56.9	1.17	1.18	2.0	1.8	9,450	8,180	.45	.46	6.0	6.0
1138	60	630	630	55.9	55.6	1.29	1.39	1.7	1.7	11,180	10,260	.49	.50	5.5	6.0
1139	80	460	460	54.8	53.4	1.39	1.39	1.4	1.4	10,100	10,670	.54	.52	6.0	5.8
	100	310	315	54.5	54.3	1.31	1.30	1.1	1.2	10,900	10,800	.57	.58	6.8	6.8
	0	875	...	57.2	...	.42	...	2.9	..	1,665	.....	.27	...	5.0	..
	20	855	850	54.5	56.7	1.01	.96	2.6	2.5	5,880	5,200	.41	.38	7.0	6.8
1140	40	780	785	53.4	54.2	1.18	1.15	2.1	2.0	8,910	7,670	.47	.45	6.3	6.3
1141	60	620	630	54.6	54.3	1.31	1.25	1.8	1.7	10,660	9,000	.52	.52	6.3	6.5
1142	80	440	450	52.9	52.6	1.30	1.27	1.4	1.4	10,000	10,075	.56	.54	7.0	7.0
	100	300	305	52.1	53.5	1.24	1.18	1.2	1.1	10,850	10,860	.59	.59	7.0	7.3
	0	870	...	64.3	...	.22	...	2.3	..	968	.....	.23	...	3.5	..
	20	850	855	54.3	53.4	.69	.77	2.3	2.3	4,220	4,045	.36	.37	5.8	4.0
1178	40	795	805	54.0	54.0	1.00	.93	1.8	1.9	5,460	5,750	.42	.43	5.8	5.8
1179	60	680	685	53.5	54.2	1.09	1.08	1.6	1.5	6,800	6,900	.46	.46	5.0	5.0
1180	80	500	510	52.4	53.2	1.16	1.17	1.4	1.4	8,860	9,260	.50	.49	5.0	5.0
	100	385	380	50.7	50.1	1.16	1.09	1.2	1.2	8,840	9,200	.52	.52	5.0	5.8

Digestion designation	Bleach requirement: Standard bleach powder added	Ives readings: Red	Ives readings: Green	Ives readings: Blue	Chemical analysis: Cellulose: Total	Cellulose: Alpha	Lignin	Total pentosans	Chlorine number (Roe)
	%	parts	parts	parts	%	%	%	%	%
	0	45	33	26	90.1	73.9	4.4	9.2	4.8
	20	77	62	49					
1135	25	78	68	56					
1136	35	88	80	72					
	0	47	35	28	91.2	76.6	3.6	8.9	4.6
	20	77	64	51					
1137	25	86	75	64					
1138	35	92	86	79					
1139									
	0	47	33	27	89.5	74.0	3.1	7.5	5.0
	20	78	64	52					
1140	25	82	72	61					
1141	35	89	82	77					
1142									
	0	55	39	32	91.7	75.6	5.0	6.6	6.2
	25	77	61	49					
1178	35	82	74	63					
1179	45	84	79	72					
1180									

for the pulps from the middle logs were 1 and 2.5% higher, respectively, than were obtained from pulp from the other parts of the tree. Pulps from the top and butt portions were somewhat lower in both total- and alpha-cellulose than an average commercial sulphate pulp.

For the usual comparison of strength values on an equal freeness basis, the strength properties of the pulps from the several elevations in the trees were plotted against Schopper freeness values. While the range of values was not large, the trends definitely show the same relationships generally found in other softwood species. The bursting and tensile strength properties of the pulps increase in proceeding upward in the trunk of the tree, while the resistance to tear tended to decrease with the greatest spread between the middle and top bolts. In comparing strength properties of the pulps from different portions of the trees, those from the middle portion more closely resemble those from the top bolts in bursting and tensile properties, whereas in tearing resistance they more closely resemble the pulps from the butt portion. Thus the wood from the central portions of the tree appeared to be superior for pulp production.

Only small variations were found in the values for solid fraction or sheet density of the pulps from different parts of the tree, those from the middle portion being the most dense and those from the top bolts the least or most bulky. Even though the fibers of this species are long and thin, visual inspection of the handsheets indicated good felting properties.

In spite of definite differences in strength properties and chemical analysis among the pulps from different locations in the trees, the sulphate pulps from this shipment as a whole showed a certain uniformity in properties without very wide variations in values; furthermore, the pulps required the same time for beating irrespective of the location of the wood in the tree. This general uniformity among the sulphate pulps can be attributed to the fact that the wood in this shipment is more characteristic of northern species with their slower and more uniform growth than of the southern woods, which grow faster and usually show a more uneven growth and a greater variation in wood properties of individual trees.

The strength values of western white pine sulphate pulps would probably be classed as about 10% below those of an average commercial sulphate pulp. This generalization is based on comparisons of bursting and tear values. The tensile strengths of the pulps from this species were satisfactory and their resistance to tear approximately equal to that of northern jack pine sulphate pulps. However, these properties are not believed to compensate entirely for the somewhat lower bursting properties of western white pine pulps.

Cooking with sodium hydroxide alone indicates that this process is much inferior to the sulphate for this species. Even though the yield of soda pulp and its resistance to tear are satisfactory, the bursting and tensile strengths were low in comparison with those prepared by the sulphate process from the same sample of wood. Contrary to expectations, neither the bleach requirement of the soda pulps nor their purity as judged by chemical analysis showed any improvement over those prepared by the sulphate process in spite of the fact that a longer cooking period, higher concentrations, and higher chemical ratios were employed in the former than in the latter method. In fact, the soda pulps contained more lignin and were considerably more difficult to bleach than the sulphate pulps.

Lake States TAPPI Discusses Pulp

The Lake States Section of the Technical Association of the Pulp and Paper Industry met at the Conway Hotel, Appleton, Wis., on December 10. Martin L. Downs of the Thilmany Pulp and Paper Company presided as chairman. Rex Vincent of the Bulkley, Dunton Pulp Company gave an interesting talk on the domestic pulp situation in the United States. Colored motion pictures of the logging operations on the West Coast were then shown, and a colored sound film showing the manufacture of bleached and unbleached pulp in West Coast mills was presented.

Those present included: E. P. Arpin, Aaron Avenell, Charles Babb, Jr., Charles M. Beach, D. H. Beisil, H. W. Bialkowsky, Peter B. Borlew, G. J. Brabender, Glen Carroll, H. Y. Charbonnier, N. H. Christian, R. A. Diehm, Frank Donaiski, H. A. DuBois, R. B. Elliott, J. A. Extrom, Ted Folstad, William J. Foote, H. V. Frederick, A. T. Gardner, John P. Gerhauser, John Graff, L. L. Griffiths, Jr., John W. Grimes, William S. Grimes, P. B. K'Burg, Kenneth D. Hay, E. G. Heberlein, A. D. Kirk, Richard G. Knechtges, C. Krake, Otto Kress, Harold Kriekard, Stephen Kukolich, C. E. Johnson, L. J. Johnson, O. B. Johnson, A. Lewenstein, J. O. Logan, N. L. Malcove, C. H. McCarthy, W. M. McGraw, L. A. Moss, S. R. Parsons, Frank Pelot, L. B. Penhallow, K. E. Pinkerton, T. R. Probst, R. M. Radsch, R. O. Ragan, E. W. Rasmussen, Henry Reeves, Jr., Herbert W. Rowe, G. H. Sheets, C. J. Smith, R. G. Smith, C. W. Steele, W. H. Swanson, C. R. Swett, R. D. Totten, J. A. Van den Akker, Rex Vincent, H. L. Voss, S. D. Wells, H. Wenberg, J. C. Wollwage and R. J. Zaumeyer.

Kalamazoo TAPPI Discuss White Water

The Kalamazoo Valley Section of the Technical Association of the Pulp and Paper Industry met at the Park-American Hotel, Kalamazoo, Mich., Thursday evening, December 5. Fred Chappell of the Hercules Powder Company presided as chairman.

Richard Tutt, Jr., of the Peter Cooper Glue Company presented a paper on "The Sveen Process and the Closed System." Mr. Tutt told about the saving of filler in white water systems due to the use of Sveen glues. A colored film showing the woods operations of the Soundview Pulp Company was shown through the courtesy of the Bulkley, Dunton Pulp Company.

Those present were: D. D. Bachelder, R. L. Barton, Bernard Benson, Herman L. Berg, N. J. Berger, Harry C. Bradford, F. L. Brown, P. S. Cade, Fred L. Chappell, Jr., N. J. Cowie, Frank B. Eilers, Frederick Elliott, M. Fogerty, O. F. Fischer, R. D. Freeman, Henry M. Gibb, Jack Hartung, J. A. Heenan, G. S. Ingling, W. A. Kirkpatrick, W. O. Manor, A. McPhillips, Leonard Nowell, Martin J. Roberts, John Roslund, G. C. Schmid, Fred K. Shankweiler, A. L. Sherwood, Robert B. Stewart, Glenn F. Touse, R. Tutt, Jr., R. W. Van Kirk, J. Waber and Clarence A. White.

The Chemical Composition of Balsam Bark*

By Kenneth D. Hay[1] and Harry F. Lewis[2]

Abstract

An analysis has been made of the extractives and of the extractive-free bark from balsam. Gelatinized particles have been observed on heating extractive-free bark with water. The possible relation of these particles to pitch trouble in the manufacture of paper from balsam is discussed.

To the pulp- and papermaker, bark is a necessary evil which must be disposed of in the easiest and most economical way possible. In the majority of cases this is accomplished by pressing it dry and burning in the bark burner, offering some return for the work expended. At the present time few barks find any other use, although in certain cases the bark may be extracted for its tannin content, and the extract used in the tanning of leather.

Historical Review

A survey of the literature shows a great lack of information concerning the chemical composition of pulpwood barks from the point of view of the pulp maker. Experiments on barks have been made largely for the purpose of finding compounds of value in medicine, tanning compounds, or resins, such as Canada balsam. Some work has been carried out, especially in Europe, with regard to the use of barks as a possible source of sugar for alcohol production.

Czapek *(1)* studied the composition of the inorganic constituents in the ash of barks, and Zellner and his co-workers *(2 to 9)* have investigated the chemical composition of several barks, including the determination of the crude fiber content. This latter work concerned itself largely with wood species not commonly used for pulping.

In 1902 Krug *(10)* reported on the alpha- and beta-cellulose contents of the bark of western hemlock and of several oaks. More recently, Sharkov *(11)* carried on a comprehensive study of the bark of pulpwood species, including pine, spruce, and birch. Included in the chemical constants determined were values for cellulose, hexosans, uronic acids, pentosans, lignin, and methoxyl in lignin.

Many of the materials isolated have been described in general terms, such as wax, pectin-like substances, fats, or hexosans, with little or no attempt to identify the particular material. Of the compounds listed, those most abundant in the nonaqueous extract include members of the higher alcohols, fats and fatty acids, resins, resin acids, resin alcohols, and waxes. Palmitic and stearic acid, and to a lesser extent oleic and linoleic acids are the most common fatty acids found.

In the aqueous extract, tannins, nontannins, and sugars predominate. Among the hexoses, glucose, fructose, galactose, mannose, and rhamnose derivative have been reported. The pentoses include only arabinose and xylose.

On the whole, the results have not been sufficiently comprehensive to permit any conclusions as to the distribution of various compounds among either the genus or genera of trees.

The literature survey indicates rather closely the scarcity of scientific data on the chemical composition of the barks of important pulpwood species. It has been the purpose of this investigation to present a rather comprehensive picture of the general components of one bark obtained as a byproduct in a number of pulp mills in this country. The bark is that of the balsam tree. Unfortunately, sufficient time has not been available for an extensive investigation of the actual chemical components of certain fractions.

Source and Preparation of the Sample

The balsam tree *(Abies balsamae)* from which the bark sample was secured was a specimen freshly cut in the vicinity of Channing, Michigan. Its water content as indicated by the xylene method was 17.45%. The moisture content, determined by heating to constant weight at 105 deg. C., was 19.5%; the difference in weight loss came not only from moisture but also from the oils volatile at 105 deg. C.

Due to the presence of resins and oils in the bark, grinding to a fine powder was almost an impossibility. It was therefore first fed through a Williams hammer mill with ¼-inch screen plates in place. The course meal thus prepared was stored in wide-mouthed five-gallon glass jars with airtight covers for later testing. The untreated bark was also stored in similarly covered containers. In each case, paper towels soaked with toluene were placed in the containers to reduce fermentation.

Separation of the Extractive Fractions

For the purposes of classification, we can look upon bark as made up of two general types of substances: those which are associated with the structural elements, and those which may be termed extractives because they are soluble in inert chemical solvents, such as petroleum ether, ethyl ether, alcohol, or water. The extractives in their turn may be separated into simpler groups by making use of their differences in solubility and other physical properties. One of the most common methods of separation is that described by Kurth *(12)* which includes the following steps: (1) distillation with steam which separates the more volatile acids, aldehydes, hydrocarbons, and alcohols; (2) subsequent extraction with ethyl ether to remove fats, fatty acids, phytosterols, resenes, resin acids, and waxes; (3) extraction with alcohol to take up phlobaphenes, tannins, coloring matter, and some material soluble in water; (4) a final water extraction to remove sugars, salts, polysaccharides, and some of the more easily hydrolyzed carbohydrates; and (5) the residue from the above extractions is called extract-free bark and contains cellulose, lignin, and insoluble bark components.

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Olympic Hotel, Seattle, Wash., Aug. 20-23, 1940.

A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Master of Science from Lawrence College, Appleton, Wis., June, 1939.

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It must be realized that the lines of separation in the above extractions are not extremely sharp, and there is bound to be some overlapping of components. For example, prolonged extraction with ether tends to dissolve the natural pigments related to the phlobotannins listed in the alcohol-soluble group. The water extraction likewise seemed to have no definite end point, for even after 30 extractions of two hours each in water heated nearly to boiling, 0.5% of water-soluble material was found in the filtrate following the last extraction. This was probably caused by a mild hydrolysis, for the material removed in each case during the last few extractions was fairly constant. Zellner *(6)* modified this procedure by first extracting with petroleum ether. This permits a finer separation of the extractives, but in view of the fact that a detailed account of his procedure was not available, Kurth's method was followed. The amounts of material removed from the balsam bark by the various extractions have been summarized in Table I.

TABLE I.—AMOUNTS OF EXTRACTIVES

	Moisture-Free Bark, %	Refractive Index
Distillation with steam	0.8	.....
Ether extract	14.1	1.5190
Subsequent alcohol extract	2.3	.....
Subsequent water extract (80-90 deg. C.)	14.3	.....
Water extract (boiling water)	17.3	.....
Petroleum ether extract	11.8	1.5148
Subsequent ether extract	2.1	1.4850
Carbon tetrachloride extract	13.5	1.5156
Absolute alcohol extract	15.2	1.514

Components of the Extracted Fractions

Oils volatile in steam

The materials volatile in steam include hydrocarbons, acids, aldehydes, and alcohols. From the steam distillate there was recovered 0.8 % of a colorless oil, having physical properties very much the same as those for balsam fir oil *(13)*. The refractive index of the oil was 1.4835, the specific gravity at 20 deg. C. was 0.8658, the optical rotation at $[\alpha]_D^{20}$ was −25.36, and the boiling range largely over 100 deg. C.; the oil was practically neutral.

Ethyl ether extract

To separate the various constituents in the ethyl ether extract of the balsam bark, the procedure given by Kurth *(12)* was followed. Without attempting to give the procedure in detail, the results have been summarized in Table II.

TABLE II.—COMPOSITION OF THE ETHYL ETHER EXTRACT

	Moisture-Free Bark, %	Extract %
Ether extract	14.1	100.0
Crude resenes	2.5	17.7
Phytosterols	0.6	4.2
Glycerol	present	
Resin acids	5.7	40.3
Oxidized acids	1.0	7.1
Saturated acids	0.7	4.9
Unsaturated acids	3.7	26.1

Ethyl alcohol extract

Alcohol removes from the wood the coloring matter, tannins, phlobaphenes, and a part of the material soluble in water. Of these materials, phlobaphenes are insoluble in water. The coloring matter and tannins are soluble in ethyl acetate, and following the removal of phlobaphenes, these may be extracted from the aqueous solution. The composition of the alcohol-extract fraction of the balsam bark has been summarized in Table III.

TABLE III.—COMPOSITION OF ALCOHOL-SOLUBLE FRACTION

	Moisture-Free Bark, %	Extract %
Alcohol extract	2.3	100.0
Phlobaphenes	0.98	40.2
Water-soluble material (alcohol-soluble sugars, etc.)	1.3	52.8
Coloring matter	0.13	5.3
Tannin	0.05	2.0

Water extract

The water extract of the ether- and alcohol-extracted bark residue contains a mixture of miscellaneous substances including salts, sugars, cycloses, nonsugar polysaccharides, gums, mucilages, starch, pectin-like materials, and galactans, although it is seldom that all of these materials are found in one extract. The solution was first concentrated under reduced pressure, and the more insoluble material removed by filtration. The thick syrup thus obtained was further concentrated *in vacuo* and treated with acetone to dissolve any modified tannins or phlobaphenes. The material removed amounted to 0.4% of the dry bark.

The semisolid water extract was diluted to 250 cc., and 10-cc. samples were evaporated to dryness to determine the solids content of the solution. The ash in the total solids was determined on a portion of the residue after evaporation.

Aliquots of the above stock solution were tested for reducing matter by a modified Allen's method. Further aliquots were precipitated with alcohol in order to determine the nonsugar polysaccharides. The alcoholic filtrate from the polysaccharides was allowed to stand for 48 hours to permit cycloses to crystallize, but none were found. Salts and nonreducing matter in the alcoholic filtrate were found by evaporating an aliquot to dryness.

An aliquot of the alcoholic filtrate described in the previous paragraph was then evaporated under reduced pressure, diluted with water and sterile yeast extract, and sterilized twice in boiling water for 20 minutes, 12 hours apart. Separate samples were then inoculated with *Sacchara cerevisiae* and with *Torula datilla*. After six days incubation, the hexose content of the aliquot was determined in order to estimate the amount of galactose present. A negative mannose test with phenylhydrazine was also obtained. The residual sugar-yeast extract solutions were resterilized, inoculated with Organisms 19 and 36, and incubated for 12 days at 29 deg. C. A final test in-

TABLE IV.—COMPOSITION OF WATER-SOLUBLE CONSTITUENTS

	Moisture-Free Bark, %	Extract %
Water extract	14.3	100.0
Insoluble material on concentration	0.6	4.0
Modified tannins and phlobaphenes	0.4	3.1
Ash	0.8	5.7
Cycloses	0.0	.....
Reducing sugar as glucose	1.9	13.5
Salts and nonreducing matter soluble in alcohol	2.9	20.4
Alcohol-soluble polysaccharides	1.6	10.9
1. Hexoses	0.4	2.5
2. Galactose	trace	....
3. Mannose	0.0	....
4. Glucose	0.4	2.5
5. Pentoses	1.2	8.5
a. Arabinose	0.9	6.1
b. Xylose	0.0	....
6. Not accounted for	0.3	2.4
Nonsugar polysaccharides	9.9	69.0
1. Total reducing sugar after hydrolysis	4.8	33.9
a. Hexoses	0.8	5.7
(1) Galactose	0.3	2.1
(2) Mannose	0.0	....
(3) Glucose	0.5	3.6
b. Pentoses	4.0	28.0
(1) Arabinose	0.9	6.3
(2) Xylose	0.8	5.6
(3) Not accounted for	2.3	16.1
2. Uronic acid anhydride	1.1	7.7
3. Residue after hydrolysis	4.0	28.0

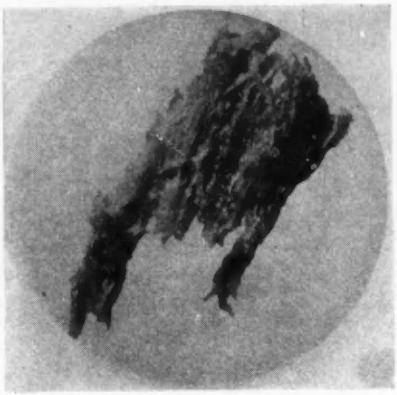

FIG. 1a
A Gelatinized Particle Before Swelling (10×)

FIG. 1b
Same Particle After Swelling (10×)

dicated the presence of arabinose and the absence of xylose.

The nonsugar polysaccharides obtained above were further broken down by hydrolysis with boiling 3% sulphuric acid, and uronic acids were determined in the filtrate by precipitation as barium salts on pouring into alcohol. Insoluble barium salts were then removed and the alcohol filtrate tested for its sugar content. The amounts of the various components of the water fraction of balsam bark are summarized in Table IV.

Components of the Extract-Free Bark

The residue remaining after the bark had been extracted with petroleum ether, ethyl ether, alcohol, and water was ground in a Bauer grinder until all had passed a 60-mesh sieve. The portion remaining on the 80-mesh sieve was used for analysis.

The following chemical constants were determined on this material: lignin, methoxyl in lignin, alpha-cellulose, beta-cellulose, gamma-cellulose, Cross and Bevan cellulose, pentosans, fermentable hexoses in the hydrolyzed bark, pentoses, and pectin material. Inasmuch as the analytical methods used are in general standard methods, no attempt will be made to discuss them in detail, other than to say that the lignin was determined by the 72% sulphuric acid method, pentosans by distillation in 12% hydrochloric acid and precipitation with phloroglucinol, alpha-cellulose by quantitative estimation of the material insoluble in 17.5% caustic solution and beta- and gamma-celluloses on the filtrates from the alpha-cellulose by a volumetric method involving the use of potassium dichromate. The components of the extract-free bark are listed in Table VI.

Tests were run to determine whether or not there was any humus formation from the sugars during the extraction process. These determinations were made by analyzing the ether-alcohol extracted bark for total reducing sugars, then analyzing both the water extract and the extract-free bark for total reducing sugars.

TABLE VI.—COMPOSITION OF THE EXTRACT-FREE BARK

	Moisture-Free Bark, %	Extract-Free Bark, %
Extract-free bark	68.5	100.0
Lignin	24.8	36.6
1. Methoxyl (based on lignin)	11.8	....
Alpha-cellulose	36.4	53.9
Beta-cellulose	1.6	2.3
Gamma-cellulose	4.6	6.9
Cross and Bevan cellulose	36.7	54.3
Pentosans	6.7	9.9
Fermentable hexoses in the hydrolyzed bark	36.3	53.8
1. Galactose	trace	....
2. Mannose	0.2	0.2
3. Glucose	36.1	53.8
Pentoses	5.2	7.8
1. Arabinose	3.0	4.5
2. Xylose	2.1	3.2
Crude pectinaceous material soluble in 0.05 *N* hydrochloric acid	2.7	4.0
Crude pectinaceous material soluble in 5% ammonium hydroxide	0.7	1.0
Indicated calcium pectate	0.6	0.8

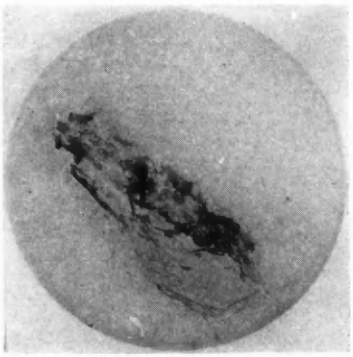

FIG. 2a
A Gelatinized Particle Before Swelling (10×)

FIG. 2b
Same Particle After Swelling (10×)

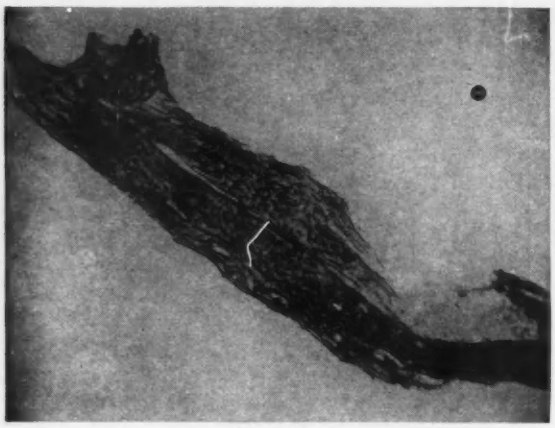

FIG. 3
A Partially Macerated Gelatinized Particle Showing Sieve Tubes and Stone Cells (50×)

The ether-alcohol extracted bark was found to have a total of 49.7% of total reducing sugars calculated as glucose. The sum of the reducing sugars in the water extract and in the extract-free bark amounted to 47.9%, thus indicating very little decomposition of the sugars as a result of the water extraction process.

Gelatinous Particles in the Bark

When the ether-alcohol extracted bark was heated with water for approximately 24 hours, certain particles became covered with a clear, firm, transparent gel of considerable thickness. Extraction with further quantities of water for three to four days removed the gel completely. This gel gave a negative test for starch with iodine-potassium iodide indicator. Analysis of the nonsugar polysaccharides in the water extract of the bark indicated large amounts of polyuronic material together with some galactose, glucose, arabinose, and xylose. Such substances point to the presence of a gum, mucilage, or pectin-like material, any one of which would swell to give the gelatinous particles. The structure of the nonsugar polysaccharide as indicated by the substances present did not correspond to any common gum or mucilage.

The particles were both spherical and shive-like in shape. Figures 1 and 2 show the particles before and after swelling. An examination of these particles at a higher magnification showed that the shive-like ones are composed of sieve tubes and stone cells. The spherical particles are composed largely of stone cells. Eames and MacDaniels *(14)* state that stone cells may contain the contents of protoplast, such as tannin and mucilage. Since the stone cells are very thick-walled, any macerating solution would be slow to penetrate masses of them. Figure 3 shows a partially macerated particle at a magnification of 50 diameters, showing how the sieve tubes are held together by a mat of stone cells. The stone cells are more clearly shown in Fig. 4 at a magnification of 100 diameters.

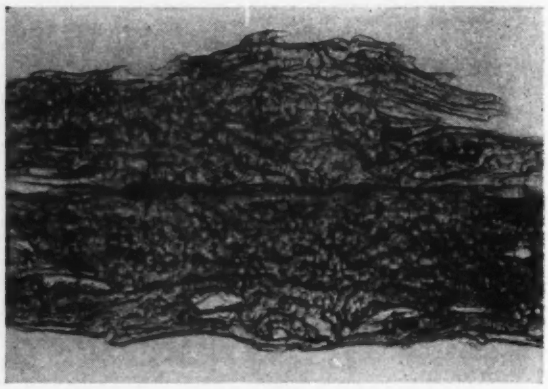

FIG. 4
Same Particle Showing the Layer of Stone Cells on Top of the Sieve Tubes (100×)

In order to determine from what portion of the bark the particles come, the bark was sectioned and examined under the microscope. In the radial section (Fig. 5 at a magnification of 50 diameters) it is easily seen that the stone cells are found in all parts of the bark, whereas the sieve tubes are found only in the inner bark. The stone cells may be observed as layers between the sieve tubes and also as large groups in the outer bark. The layers of stone cells between the sieve tubes are better shown at a magnification of 100 diameters in Fig. 6 which also shows clearly the general shape of the stone cells.

These photographs demonstrate the manner in which the two types of particles are formed. When

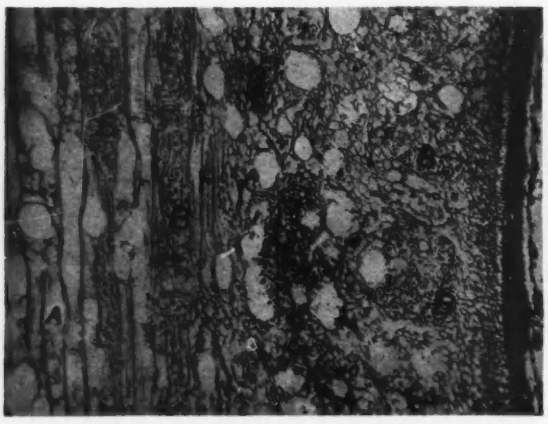

FIG. 5
Radial Section of Balsam Bark (50×)

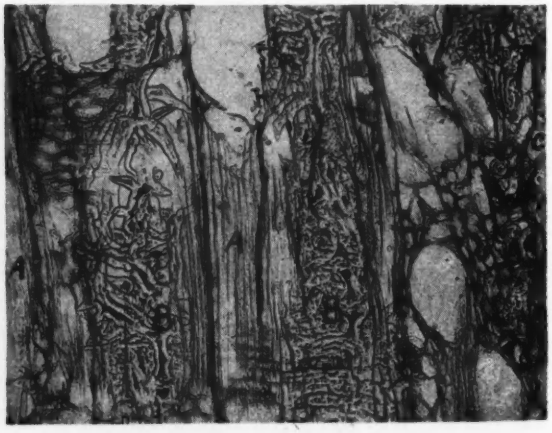

FIG. 6
Radial Section of Balsam Bark (100×). A—Sieve Tubes. B—Stone Cells. C—Outer Side of Bark.

the bark was reduced in size, the outer portion containing no sieve tubes was pulverized to small particles containing many stone cells, whereas the inner bark was reduced to shives, many of which contained layers of stone cells.

Although there is no definite proof and much study is still necessary, these gelatinized particles are presented as a possible source of the pitch trouble often met in the production of paper from balsam wood. During the barking operation, small bits of bark are driven into the broom ends or are left on the logs. Since the bark is well permeated with resin, the penetration of the sulphite liquor into the bark particle would be slow. The suspension of the pulp in warm water for some time before it is finally made into paper would give the gel time to swell. The final result would be small transparent spots in the sheet.

Conclusions

Balsam bark has been analyzed for its important chemical components. The components found and calculated to the moisture-free bark include the following:

1. A small amount of oils volatile in steam.
2. Approximately 14% of resenes, phytosterols, resins, and fatty acids. This fraction may have some interest as a characteristic oil to be added to soaps, talcum powders, bath salts, etc., or as a source of Canada balsam.
3. Slightly more than 2% of alcohol-soluble tannins, phlobaphenes, and alcohol-soluble sugars.
4. Approximately 14% of water-soluble salts, mucilage (or pectin), and carbohydrates. This fraction may very likely be responsible for occasional pitch troubles encountered when balsam is being cooked, for the mucilage is associated at least in part with stone cells, and these are penetrated but slowly by sulphite liquor. When they are present in the pulp by contamination of the wood with bark fragments, they may possibly swell in water to form transparent gelatinous specks in the paper.

The extractive-free bark makes up 68.5% of the total moisture-free bark. It contains:

5. Cross and Bevan cellulose to the extent of 36.7% of the moisture-free bark.
6. A fraction isolated as lignin amounting to 24.8% of the bark. Since the methoxyl content of the lignin is only 11.8%, it may be contaminated by other bark substances low in methoxyl, or else the balsam bark lignin is lower in methoxyl than balsam wood lignin. (This is not the case with one other coniferous lignin already investigated.) A methoxyl content of 14.3% corresponds to four methoxyls per lignin unit of molecular weight of 870. A methoxyl content of 10.7% indicates three methoxyls.
7. A pentosan content of 6.7%.

The sum of the volatile oils, ether extract, alcohol extract, water extract, Cross and Bevan cellulose, lignin, and pentosans comes to 99.7%. Undoubtedly there is duplication in the Cross and Bevan cellulose and pentosan values which would lower the total. In spite of this it may be stated that the major constituents of balsam bark have been identified.

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Sulphur Dioxide Over-All Absorption*

By W. L. Beuschlein[1] and Milton Austin Porter[1]

Abstract

The purpose of this work was to determine the effect of dissolved calcium bisulphite upon the resistance of the liquid film to the transfer of sulphur dioxide at the gas-liquid interface. The study was carried out by varying the conditions of operation in a vertical, wetted-wall, counterflow, glass absorption tower. The experiments indicated that, over the range investigated, the presence of combined sulphur dioxide had no effect upon the over-all absorption coefficient K_G.

Mechanism of Absorption

Absorption, stripping, and evaporation phenomena are best explained and studied on the basis of the two-film theory. For the purpose of discussion let us consider only the mechanism of absorption.

The two-film theory postulates that at a gas-liquid interface there exist a gas layer and a liquid layer which are relatively stationary and across which transfer of the absorbed gas takes place by diffusion alone. Across these layers there is a drop in concentration of the absorbed gas, whereas it is assumed that the concentrations in the main bodies of the separate fluids are uniform due to convection currents and turbulent conditions.

In consideration of this theory the equations for gas absorption in a liquid are written as

$$\frac{dW}{SdO} = k_G(P_{AG} - P_{Ai}) = k_L(C_i - C_L) \qquad (1)$$

For the case where Henry's law holds and is expressed as

$$C_L = HP_{AL}, \qquad (2)$$

the relationships which exist between the absorption coefficients are

$$\frac{1}{K_G} = \frac{1}{Hk_L} + \frac{1}{k_G} = \frac{1}{HK_L} \text{ (9)} \qquad (3)$$

and the absorption equation becomes

$$\frac{dW}{SdO} = K_G(P_{AG} - P_{AL}) = K_L(C_G - C_L)\ . \qquad (4)$$

The characteristics of the sulphur dioxide and water make this system interesting, as well as fairly simple from the experimental standpoint, for the study of absorption and desorption at a gas-liquid interface. Consequently numerous investigators have studied the effects of temperature, gas velocity, and liquid velocity upon the absorption rate of sulphur dioxide in pure water both in wetted-wall and packed towers.

The data obtained by these early workers contributed much toward an understanding of the absorption mechanism and was also of interest to the design engineer in the sulphite paper industry. How-

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ever, from the design standpoint the picture was not complete because of the presence of dissolved calcium bissulphite as well as the solid phase, calcium carbonate, in the sulphite acid tower.

From equation 4 it can be seen that a study of the absorption characteristics of a system must be preceded by a knowledge of the equilibrium conditions involved, Smith and Parkhurst *(8)* were among the first to obtain equilibrium data for the solubility of sulphur dioxide in solutions containing alkali in the form of calcium and magnesium hydroxides. They showed that the concentration of totally free sulphur dioxide, or sulphurous acid, in water and in calcium and magnesium bisulphite solutions is directly proportional to the partial pressure of sulphur dioxide in equilibrium with the solution, for constant conditions of temperature and alkali concentration within the range investigated.

Smith and Parkhurst presented their data as a plot of sulphur dioxide partial pressure *versus* sulphurous acid concentration, obtaining a series of straight lines with different slopes, each for a constant temperature and alkali concentration, which they extrapolated through the origin. These data were a very definite contribution inasmuch as they established the application of Henry's law and represented a basis for the calculation of absorption coefficients using the logarithmic mean driving force. However, extrapolation of these plots through the origin was not entirely proper, except in the case of zero alkali concentration, since for each alkali concentration there is a certain minimum concentration of sulphurous acid required to prevent precipitation. Smith and Parkhurst had thus extended their plots through the super-saturated region without so indicating.

It remained for Beuschlein and Conrad *(1, 2)* to clarify the picture with their saturation curves for the system calcium oxide-sulphur dioxide-water. For each temperature, they made a plot of total dissolved sulphur dioxide *versus* partial pressure of sulphur dioxide in the gas phase. Their data were later checked and extended by Ives and Newstrom *(6)*.

Apparatus and Procedure

The wetted-wall tower was a Pyrex glass tube, 55/64 inch i.d. by 5 feet long, ground square at the top to insure a uniform distribution of the liquor flowing down the inner surface. Surrounding the tower was a thermostatic water jacket which consisted of another Pyrex glass tube and through which water was circulated from a thermostated tank.

In order to eliminate any effect from the diffusion of water vapor through the gas film, the carrier gas, air, was saturated with water vapor by admitting steam into the line. The excess steam was condensed and the temperature of the gas steam controlled by means of a condenser on the downstream side. The condensate was removed from the air steam by means of a separator which consisted of an enlarged return bend in the pipe line loosely packed with copper gauze and with a cock at the bottom from which the condensate was continuously blown with a small jet of air. The saturated air supply was metered through a sharp edged orifice which had been calibrated against a meter recently checked by the Seattle Gas Company.

Refrigeration grade sulphur dioxide was vaporized by passing through a reducing valve and the gas passed through an orifice meter. This meter was not calibrated but was used only to hold the flow of gas constant. Straight calming sections were placed in the gas line before and after the tower, their purpose being to smooth out excessive turbulence resulting from ells. The entering gas mixture was analyzed using an Orsat apparatus containing potassium hydroxide as the absorbing reagent and mercury with a drop of water on the surface as the retaining liquid. The total pressure in the tower was determined at the upstream calming section.

All runs were made with a counterflow of gas and liquor. After flowing down the tower, the liquor followed the curve of the glass and entered an enlarged section from which it was caught in a 100 cc. volumetric flask. From the liquor analyses and the rate of flow, the absorption rate in mols. per hour was readily calculated. Since all runs were made at a temperature of 25 deg. C., it was not found necessary to lag the various lines.

The solutions containing combined sulphur dioxide were made up by bubbling sulphur dioxide into a milk of lime suspension, the lime used being the U.S.P. grade. Analyses of these solutions using standard iodine and sodium hydroxide reagent solutions did not give consistent results, although Conrad and Beuschlein *(2)*, Ives and Newstrom *(6)*, and Fisher *(3)* had all used this analytical method without difficulty. However, their solutions were made with a pure lime obtained by calcining C.P. grade calcium oxalate in the muffle furnace. The difficulties experienced were obviated by using the potassium iodate and sodium hydroxide method of analysis which was developed by Palmrose *(7)*. This method gave analyses which could be checked to 0.01 pound sulphur dioxide per 100 pounds of water.

Experimental Results

A total of 85 runs were made, however, only 70 are reported as five were made to develop technique and the results of 10 were discarded because difficulties in holding the flow rates constant or in keeping the tower surface wet invalidated the results. Tables I and II are tabulations of runs made with solutions containing no combined sulphur dioxide. Runs 6 to 15, listed in Table I, were made with constant gas velocity and varying liquor velocity while runs 16 to 37 and 66 to 70 were made with varying gas velocity and the liquor velocity held within close limits. Table III and IV are tabulations of the runs made with solutions containing combined sulphur dioxide.

In Table I the runs are listed in order of increasing liquor velocity, while in Tables II, III, and IV the runs are listed in order of increasing Reynold's number. Runs 9, 10, 12, 14, and 15, listed in Table I, would be included in Table II between runs 37 and

TABLE I.—DATA ON RUNS MADE WITH Z = O AND Re CONSTANT

Run	13	12	15	9	10	14	11	7	6	8
Re	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500
K_G	0.053	0.058	0.058	0.066	0.065	0.054	0.067	0.076	0.066	0.067
L	15	18	20	22	22	23	63	115	117	120
Entering Gas, % SO_2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2
T_1	1.32	1.28	1.23	1.25	1.26	1.16	0.73	0.51	0.45	0.45
θ	143	143	143	143	143	143	143	143	143	143

TABLE II.—DATA ON RUNS MADE WITH Z = O AND L CONSTANT

Run	18	19	66	67	68	69	70	20	21	16	17	31	32	33	22	23	24	34	35	36	37	55	28	56	29	57	30	50	25	51	26	52	27	53
Re	1040	1040	1030	1030	1030	1030	1390	1620	1620	2220	2220	3120	3120	3120	3810	3810	3810	4570	4570	4570	4570	4550	7000	4550	7000	4550	7000	11200	12300	11200	12300	11200	12300	11200
K_G	0.030	0.029	0.030	0.034	0.028	0.034	0.045	0.045	0.041	0.055	0.057	0.066	0.066	0.072	0.051	0.066	0.067	0.069	0.080	0.070	0.072	0.071	0.070	0.065	0.076	0.064	0.066	0.074	0.108	0.074	0.091	0.069	0.095	0.065
L	24	21	22	27	22	30	21	24	23	22	22	22	22	24	21	23	22	18	26	18	21	25	23	24	23	24	23	25	22	25	22	25	22	25
Entering gas, % SO_2	13.9	13.9	15.4	15.4	15.4	15.4	15.2	13.2	13.2	11.6	11.6	11.9	11.9	11.9	11.9	11.9	11.9	12.3	12.3	12.3	12.3	12.7	16.8	12.7	16.8	12.7	16.8	15.1	16.0	15.1	16.0	15.1	16.2	15.1
T_1	0.77	0.82	0.88	0.85	0.87	0.79	1.13	0.93	0.92	0.95	0.97	1.07	1.07	1.05	0.97	1.04	1.05	1.16	1.10	1.16	1.13	1.92	1.49	1.92	1.54	1.92	1.46	1.96	1.59	1.96	1.55	1.96	1.56	2.80
g	27.5	27.5	26.4	26.4	26.4	26.4	35.8	43.5	43.5	62.1	62.1	87.4	87.4	87.4	106.5	106.5	106.5	125.2	125.2	125.2	125.2	124	172.8	124	172.8	124	172.8	290	305	290	305	290	305	290

TABLE III.—DATA ON RUNS MADE WITH Z = 0.73-0.88

Run	39	42	62	64	65	38	58	59	60	61	46	47	48	49	44	45
Re	1055	1055	1020	1020	1020	1610	1960	1960	1960	1960	2300	2300	2300	2300	3200	3200
K_G	0.038	0.031	0.035	0.033	0.033	0.037	0.039	0.037	0.038	0.047	0.052	0.055	0.054	0.052	0.054	0.052
L	25	20	24	21	26	31	27	26	16	26	25	26	25	25	24	24
Entering Gas, % SO_2	14.5	14.5	14.9	14.9	14.9	13.2	13.0	13.1	13.1	13.1	13.0	13.0	13.0	13.0	12.5	12.5
T_1	2.75	2.75	2.48	2.53	2.44	2.47	2.37	2.36	2.48	2.42	2.68	2.68	2.69	2.68	2.64	2.64
T_2	2.26	2.26	1.85	1.85	1.85	2.00	1.87	1.87	1.87	1.87	2.21	2.21	2.21	2.21	2.06	2.06
Z	0.88	0.88	0.77	0.77	0.77	0.83	0.73	0.73	0.73	0.73	0.85	0.85	0.85	0.85	0.85	0.85
g	27.5	27.5	26.4	26.4	26.4	43.5	53	53	53	53	62	62	62	62	87	87

28 to make this table complete. The values of L were held between 18 and 30 for the runs listed in Table II, between 16 and 31 for the runs listed in Table III, and between 16 and 26 for the runs listed in Table IV. The Maximum variation of the entering gas concentrations was from 11.6 to 16.8% sulphur dioxide on different runs. Following are the maximum variations in temperatures which occurred: gas inlet, 24 to 28 deg. C; gas outlet, 25.5 to 28 deg. C; water inlet, 23 to 26.5 deg. C; water outlet, 25 to 27.5 deg. C.

Discussion of Results

In runs 6 to 15 (Table I), made with constant gas velocity, the value of L was varied eight fold with no consistent effect on the over-all transfer factor K_G. All the subsequent runs were made with varying gas velocities and K_G was found to decrease with increase in Reynold's number. By plotting log Re *versus* log K_G for the runs made with zero combined sulphur dioxide, it was found that the data would conform approximately to the equation

$$\frac{1}{K_G} = \frac{b}{\mathrm{Re}^{0.8}} + C.$$

These data were then plotted as $1/K_G$ versus (1/Re) 0.8. By the adaptation of a principle employed by Wilson *(10)* in studying heat transfer, the significance of such a plot is that the extrapolated intercept on the y-axis is the liquid film resistance to absorption. Consequently it is evident that the effect of combined sulphur dioxide on the liquid film resistance could immediately be determined by plotting the data of Tables III and IV on the same plot. This was done and examination leads to the conclusion that, within the experimental range and the limits of experimental accuracy, combined sulphur dioxide has no effect on the absorption coefficient.

For comparative purposes, the data of Haslam, Ryan, and Weber *(5)* and of Haslam, Hershey, and Keen *(4)* were converted to the proper units and plotted. Both of these experiments were conducted in the absence of combined sulphur dioxide, Haslam, Ryan and Weber using an 8- by 30-inch tower while Haslam, Hershey, and Keen used a 3- by 36-inch tower. The significant point about the data of these workers is that the intercept on the y-axis coincides very closely with the intercept obtained from the present data. Although the number of experiments is not conclusive, the indication is that shape and size of tower, type of inlet and outlet connections, and liquor velocity have a negligible effect on the liquid film resistance.

It is essential at this point to note that the experiments of these previous workers were all at Reynold's numbers below 2750—i.e., in the streamlined flow region. Apparently absorption data obtained with a given piece of apparatus can be correlated as a function of Reynold's number, even in the streamlined region. Since gas velocity was the only factor in the Reynold's number which was varied, the correlation is actually between K_G and u, and the previous workers had tabulated their data on that basis.

The failure of correlation between different apparatus may be due to differences in design. Since it is known that gas film resistance is a function of gas stream turbulence, a plausible explanation of the lower gas film resistance observed by these previous workers is the turbulence which would exist in their towers as a result of the type of entrance and exit

TABLE IV.—DATA ON RUNS MADE WITH Z = 1.43-1.55

Run	82	83	84	85	78	79	80	81	75
Re	1750	1750	1750	1750	2440	2440	2440	2440	11100
K_G	0.038	0.038	0.040	0.037	0.057	0.057	0.047	0.053	0.086
L	24	24	25	23	20	23	16	26	24
Entering Gas, % SO_2	16.1	16.1	16.1	16.1	15.5	15.5	15.5	15.5	14.1
T_1	3.805	3.81	3.82	3.815	4.06	4.04	4.055	3.99	4.10
T_2	3.135	3.135	3.135	3.135	3.295	3.295	3.295	3.295	3.54
Z	1.43	1.43	1.43	1.43	1.50	1.50	1.50	1.50	1.55
θ	44	44	44	44	62	62	62	62	290

sections employed. Unusual turbulence always occurs where a fluid stream changes direction or where a sudden change in the size of channel occurs. Haslam, Ryan, and Weber do not describe their apparatus in detail, but it probably possessed the same characteristic as that of Haslam, Hershey, and Keen—i.e., entrance and exit sections in which occurred both changes in stream direction and changes of channel cross section. Obviously, the value of the Reynold's number calculated for a short tower in which this added turbulence occurs is not the true value. In the present work, care was taken to insure a true Reynold's number by employing an entering calming section five feet long and an exit calming section three feet long for the gas stream. These were considered adequate to keep unusual turbulence of the gas stream out of the absorbing section of the tower.

Nomenclature

Subscript 1 refers to conditions at the gas inlet end of the tower.
Subscript 2 refers to conditions at the gas outlet end of the tower.
b Constant.
c Constant.
C_L Concentration of solute gas in the liquid phase in lb. per gal.
C_G Concentration of solute gas in the liquid which would be in equilibrium with the gas phase.
C_i Concentration of solute gas in the liquid at the gas-liquid interface.
d Tower diameter in ft.
F Free sulphur dioxide in lb. per 100 lb. of water.
g Carrier gas flow, cu. ft. per hr. measured at standard conditions.
H Solubility coefficient, liquid concentration in lb. per gal. divided by equilibrium gas pressure in atm.
K_G Individual diffusion coefficient through the gas film.
K_L Individual diffusion coefficient through the liquid film.
k_G Over-all diffusion coefficient based on P, (mols)/(hr.)(sq. ft.)(atm).
k_L Over-all diffusion coefficient based on C.
L Liquid velocity in lb. per hr.
P_{AG} Partial pressure in atm. of solute gas in the gas phase.
P_{Ai} Partial pressure in atm. of solute gas at the gas-liquid interface.
P_{AL} Vapor pressure in atm. of solute gas which would be in equilibrium with the liquid phase.
P Total pressure in atm.
ΔP Difference between P_{AG} and P_{AL}.
ΔP_{lm} Logarithmic mean of ΔP_1 and ΔP_2.
S Area of liquid-gas interface in sq. ft.
T Total sulphur dioxide in lb. per 100 lb. of water.
u Linear gas velocity in ft. per hr.
V Solute gas absorbed in cu. ft. measured at standard conditions.
W Solute gas absorbed in mols.
y Gas concentration, cu. ft. per cu. ft. of carrier gas.
Z combined sulphur dioxide—i.e., the sulphur dioxide required to form the calcium monosulphite, in lb. per 100 lb. of water.
Θ Time in hours.
ρ Gas density, lb. per cu. ft.
μ Gas viscosity, lb./hr. ft.

Equations Used in the Calculation

$$T = \frac{(\text{cc. } KIO_3)(N)(32)(100)}{(1000)\ (\text{cc. sample})}$$

$$F = \frac{(\text{cc. NaOH})(N)(32)(100)}{(1000)\ (\text{cc. sample})}$$

$$Z = T - F$$

$$L = \frac{(100)(3600)}{(\text{seconds per 100 cc. liquor})(454)}$$

$$\frac{W}{\Theta} = \frac{(T_1 - T_2)(L)}{(100)(64)}$$

$$\frac{V}{\Theta} = (W/\Theta)(359)$$

$$g = \frac{(\text{cu. ft./min.})(60)(273)}{(298)}$$

$$y_1 = \frac{\%SO_2}{100 - \%SO_2}$$

$$y_2 = y_1 - \frac{V}{\Theta g}$$

$$P_{AG1} = \frac{(y_1)P}{1 + y_1}$$

$$K_G = \frac{(W/\Theta)}{(S)(P_{lm})}$$

$$\rho = \frac{[(29)(100 - \%SO_2) + (64)(\%SO_2)]\ (273)}{(100)(359)(298)}$$

$$\mu = \frac{(0.042)(100 - \%SO_2) + (0.031)(\%SO_2)}{100}$$

$$u = \frac{(\text{cu. ft. air per min.})(60)(100)}{(100 - \%SO_2)(\text{tower cross section in sq. ft.})}$$

$$\text{Re} = \frac{du\rho}{\mu}$$

The calculation of T and F using the above equations actually gives the sulphur dioxide in grams per 100 cc. of solution, however, for the concentrations employed this may be taken as equal to the pounds per 100 pounds of water. Also the calculation of L is based on the assumption that the solution contains one gram of water per cc.

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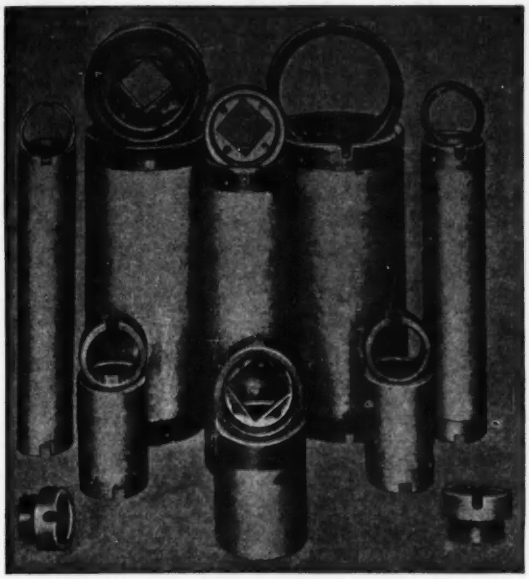

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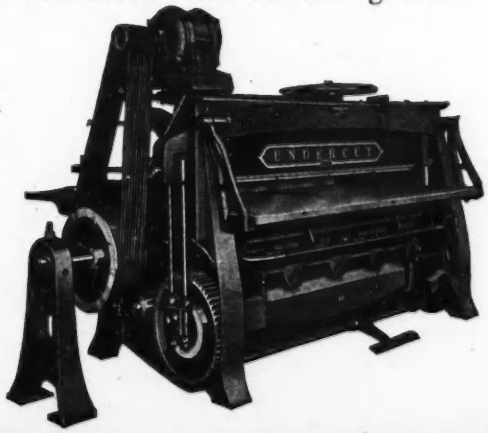

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Effective September 30, 1939, under Treasury Decision 49,970, all publications, exchanges and trade associations, were denied access to import manifests at the New York Customs House. The Paper Trade Journal and other interested parties have vigorously protested this ruling, and as soon as the order of the Treasury Department is modified or rescinded, full publication of all manifests will be resumed in these columns. In the interim, the Paper Trade Journal is making every possible effort to gather all available information from manifests, at various outside sources.

NEW YORK IMPORTS
WEEK ENDING DECEMBER 14, 1940
SUMMARY

Cigarette paper .....538 cs.
Newsprint .....7,845 rolls
Wrapping paper .....4 bls., 208 rolls
Miscellaneous paper .....9 cs.

CIGARETTE PAPER

Kuenzle & Streiff, ——, Lisbon, 20 cs.
E. F. Pipe & Co., ——, Barcelona, 30 cs.
Rohner Gehrig & Co., ——, Petsamo, 368 cs.
——, ——, Petsamo, 120 cs.

NEWSPRINT

——, ——, Comeau Bay, 7,252 rolls.
Jay Madden Corp., ——, Petsamo, 593 rolls.

WRAPPING PAPER

Arkell Safety Bag Co., ——, Petsamo, 13 rolls.
East Coast Paper Products Corp., ——, Petsamo, 6 rolls.
Superior Paper Co., ——, Petsamo, 4 bls. 189 rolls.

MISCELLANEOUS PAPER

Senefelder Co., ——, Havana, 1 cs.
Alfred Shroder Import Co., Inc., ——, Hong Kong, 8 cs.

RAGS, BAGGINGS, ETC.

Castle & Overton, Inc., ——, Buenos Aires, 13 bls. rags.
S Godfrey, ——, Buenos Aires, 37 bls. rags.
W. Reis, ——, Callao, 148 bls. cotton waste.
O'Brien Products, Inc., ——, Shanghai, 125 bls. cotton picker waste.
J. Levy & Son, ——, Havana, 15 bls. rags.
Castle & Overton, Inc., ——, Valparaiso, 21 bags wool refuse.

CASEIN

American British Chemical Supplies, ——, Buenos Aires, 917 bags.
A. Hurst & Co., ——, Buenos Aires, 50 bags.
Packing Products Co., ——, Buenos Aires, 167 bags.

WOOD PULP BOARDS

Jay Madden Corp., ——, Petsamo, 1,194 rolls, 2,222 bls.
Johaneson Wales & Sparre, Inc., ——, Petsamo, 443 rolls.
D. F. Young, ——, Petsamo, 902 bls.

BOSTON IMPORTS
WEEK ENDING DECEMBER 14, 1940

Pulp Sales Corp., ——, Petsamo, 3,750 bls. prime strong sulphite, 732 tons; 3,576 bls. prime bleached sulphate, 714 tons; 8,428 bls. prime strong sulphate, 1,498 tons.
H. Fuchs & Son, ——, Petsamo, 100 bls. wood pulp boards, 8 tons.
Specialty Converters, Inc., ——, Petsamo, 210 rolls wrapping paper.
American Reinforced Paper Co., ——, Petsamo, 6 rolls wrapping paper.
——, ——, Yokohama, 600 bls. cotton waste.

PHILADELPHIA IMPORTS
WEEK ENDING DECEMBER 14, 1940

——, ——, Bristol, 2,915 tons china clay.

BALTIMORE IMPORTS
WEEK ENDING DECEMBER 14, 1940

American Cyanamid & Chemical Corp., ——, Buenos Aires, 2,084 bags casein.

LOS ANGELES IMPORTS
WEEK ENDING DECEMBER 14, 1940

——, ——, Kobe, 12 cs. transparent paper.
——, ——, Powell River, 2,447 pkgs. newsprint.

Container Institute Restrained

WASHINGTON, D. C., December 18, 1940—The Federal Trade Commission has issued an order requiring the Cup and Container Institute, Inc., 420 Lexington Ave., New York, 8 of its officers and directors and 12 corporations controlling more than 60 per cent of the national output and sale of products of the paper drinking cup and paper food container industry, to cease and desist from a combination and conspiracy to restrain trade through the fixing and maintaining of uniform or minimum prices.

The respondents include Granville P. Rogers, president and executive director of the institute; Dale H. Eckerman, vice president and director; K. L. Stoler, secretary and director, and Henry Nias, director, all of New York; Robert J. Kieckhefer, Milwaukee; William S. Bacon, Kensington, Conn.; E. W. Skinner, Fulton, N. Y., and R. L. Allison, Springfield, Mass., directors; Dixie-Vortex Company, Chicago and Easton, Pa.; Lily-Tulip Cup Corporation, New York and its subsidiary, Crystal Paper Service Corporation, Los Angeles; Herz Cup Company, a division of Herz Manufacturing Corporation, New York; American Lace Paper Company and Milwaukee Lace Paper Company, both of Milwaukee; Eagle Cup Corporation, Brooklyn; The American Paper Goods Company, Kensington, Conn.; Logan Drinking Cup Company, a division of the United States Envelope Company, Springfield and Worcester, Mass.; Sutherland Paper Company, Kalamazoo, Mich.; and Sealright Company, Inc., a division of the Oswego Falls Corporation, Fulton, N. Y., all members of the respondent institute, and Cupples-Hesse Envelope and Lithographing Company, St. Louis. The last named company, while not a member, was found to have cooperated with the institute and to have participated in some of the activities related in the findings.

Commission findings are that beginning in 1933, the corporate respondents, and certain other manufacturers cooperating with them and the institute, through the respondent institute, have carried out agreements and understandings for prevention of price competition by fixing and maintaining in many instances uniform prices for some of the industry's products.

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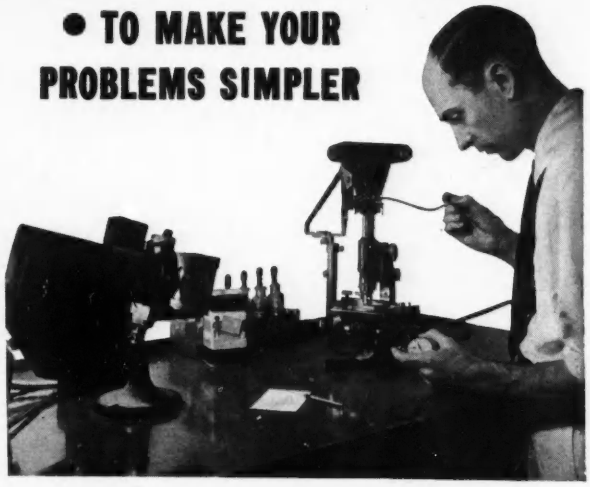

THE simplification of production processes in which chemicals are used is a matter to which more and more manufacturers are giving their attention. Simplification through better and more efficient equipment is one way, but an equally important way is through the improvement and adaptation of chemicals themselves to the changing needs of the day.

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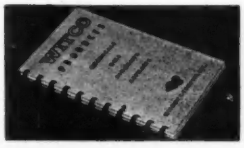

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New York Paper and Pulp Market Review

Paper Market Reflects Customary Year-End Quietness Without Change From Prevailing Prices—Pulp Market Firmer With Prices Unchanged For First 1941 Quarter—Old Manila Rope Higher.

Office of the PAPER TRADE JOURNAL,
Wednesday, December 18, 1940.

With Christmas purchasing rapidly increasing, standard lines of paper are reflecting the seasonal leveling off in demand usual at this time of the year. As inventories of general paper merchants are reported adequate to meet current moderate demand, the most activity centers in paper specialties. Mill inventories are higher than last year but are not considered too high and are somewhat lower than the average mill stocks of all manufacturers.

The index of general business activity rose to 113.8 per cent for the week ended December 7, from 112.2 per cent for the preceding week, compared with 106.6 per cent for the corresponding week last year.

Paper production of 239 mills for the week ended December 7 was estimated at 87.2 per cent, compared with 96.6 per cent for 1939, with 77.6 per cent for 1938, with 56.1 per cent for 1937, and with 93.3 per cent for the corresponding week for 1936.

Paper board production for the week ended December 7 was 78.0 per cent, compared with 79.0 per cent for 1939, with 65.0 per cent for 1938, with 53.0 per cent for 1937, and with 81.0 per cent for the corresponding week for 1936.

Wholesale sales volume in many lines of paper continues somewhat lower than trade expectations. In comparison with last year, when production and shipments averaged 9.4 per cent above the first week in December this year, current business in standard lines is disappointing. Sales of many paper specialties, however, are now reported higher than last year and are expected to set up a new high record under the present heavy Christmas buying.

Paper board sales are tapering off in a normal seasonal decline from the high peak reached a few weeks ago and business is now fair.

On the whole, the paper market is stable. Current prices are relatively low and while some advances are viewed in the trade as necessary next year to more equitably represent the relatively high cost of wood pulp, no rapid or considerable increase in paper prices is expected or desired by the industry.

Mechanical Pulp

Production of domestic and Canadian groundwood continues to gradually increase and total output for this year will be moderately higher than the total for last year. Prices hold unchanged.

Chemical Pulp

The chemical pulp market reflects more firmness this week, with reports that one producer has withdrawn its price of $63.50 per ton on the news grade of unbleached sulphite. No important change in prices has been reported to date and no change is expected in the near future.

Rags

Mill buying of rags is seasonally tapering off as manufacturers follow their usual custom of keeping stocks at a minimum prior to annual inventory taking. No important change in prices has been reported this week.

Old Rope and Bagging

No. 1 domestic and foreign Manila rope has advanced this week and is currently quoted at from 5.25 to 5.50.

Trading in old bagging is reported more active this week, with supplies rather limited. Prices remain firm, with no important changes reported to date.

Old Waste Paper

The lower grades of paper stock are reported moderately active at this date, with other grades slow. As demand for paper board is now entering its normal slack season, prior to the customary annual shut down of mills over Christmas and the inventory period, trading in this market is also at a lower ebb. Prices continue unchanged.

Twine

Reports from several quarters of the twine market indicate that the current year, as a whole, has been one of good business. Prices have held fairly well at moderate levels and prospects for the future are excellent. No important change from prevailing representative market quotations has been reported during the week.

Value of Paper Index Higher

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., December 18, 1940—October index of the value of paper and allied products manufacturers' inventories is 110.7 compared with 108.4 in September and 93.5 in October of last year taking December 31, 1938 at 100, according to the monthly industrial survey of the Department of Commerce.

Index of the value of paper and allied products manufacturers' shipments for October taking January 1939 at 100 was 131 compared with 137 in September and 135 in October of last year.

New business placed with manufacturers in October reached the highest total recorded for any month in the two years covered by the Industry Survey. Shipments advanced only slightly from the September peak, however, so that the extraordinarily heavy volume of incoming business lifted unfilled orders 19 per cent to match the very substantial September rise in this series. Inventory holdings moved up substantially during the month for the first time since the current industrial expansion began in May.

Increased orders for durable goods were primarily responsible for the October advance of 6 per cent over new business in September. Incoming business for nondurable goods showed no change from the September total but the durable goods industries registered an advance averaging 13 per cent.

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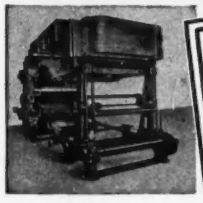

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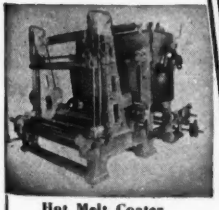
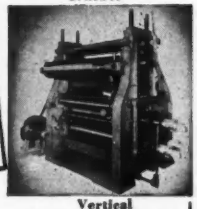


Hot Melt Coater



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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, December 18, 1940.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. Demand reported fair for the week. The pulp is currently quoted at $35 per ton, in barrels, at works; the powder is offered at $50 per ton, f.o.b., works.

BLEACHING POWDER—Prices on bleaching powder are firm with demand reported fair for the week. Bleaching powder is currently quoted at $2 per 100 pounds, in drums at works.

CASEIN—Quotations on casein are reported firm. Demand moderate for the week. Standard domestic casein, 20-30 mesh, is currently quoted at 13 cents per pound; 80-100 mesh, at 13½ cents per pound; all prices in bags, car lots. Standard Argentina casein is currently offered at 12½ cents per pound. No quotations on French casein.

CAUSTIC SODA—Prices on caustic soda are firm and unchanged. Shipments continue in steady volume. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged this week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay at from $12 to $22 per ton, at mines. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—The demand for chlorine is reported good. Prices are firm and the market strong for the current week. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported as firm with prices lower for the week, "G" gum rosin is currently quoted at $1.65 per 100 pounds, in barrels, Savannah, "FF" wood rosin is currently quoted at $1.57 per 100 pounds, in barrels, New York. Seventy per cent gum rosin is quoted at $2.40 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm under a good demand with current quotations continuing nominal. Domestic salt cake is currently quoted at $17 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $20 per ton on imported salt cake continues nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Demand reported moderate. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are reported firm and a little higher for the current week. Pearl is currently quoted at $2.95 per 100 pounds; powdered starch at $3.05 per 100 pounds; all prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported good for the week. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at $1.60 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $19 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00		
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$5.25	@	$5.75
Superstandard	4.87½	"	5.25
Northern Standard Wrapping	4.37½	"	4.62½
Standard Wrapping	4.25	"	—
Tissues—Per Ream—Carlots			
White No. 1	.97½	"	—
White No. 1 M. G.	.95	"	—
White No. 1½	.80	"	—
White No. 2	.75	"	—
Anti-Tarnish M. G.	.80	"	—
Colored	.85	"	—
Kraft	.87½	"	—
Manila	.77½	"	—
Unbl. Toilet, 1 M.	3.75	"	—
Bleached Toilet	5.26	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	4.10	"	—
Bleached, Jr.	3.60	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	8.25	@	10.25
No. 1 Manila Wrapping, 35 lb.	5.25	"	—
No. 2 Manila Wrapping, 35 lb.	5.00	"	—
Boards, per ton—			
News	35.00	@	40.00
Chip	35.00	@	40.00
Sgl. Mla. Ll. Chip	52.50	"	55.00
White Pat. Coated	65.00	"	67.50
Kraft Liners	55.00	"	—
Binders Boards	73.00	"	80.00

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10 @	$46.00	$40.25 @	$47.25
100% Rag	31.05 "	36.50	32.20 "	37.75
85% Rag	.... "	....	29.90 "	35.00
75% Rag	23.60 "	27.75	24.75 "	29.00
65% Rag	.... "	....	21.65 "	26.25
50% Rag	17.55 "	21.50	18.70 "	22.75
25% Rag	14.65 "	17.75	15.80 "	19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$9.35 @	$11.50	$11.55 @	$12.75
No. 2	8.50 "	10.25	9.65 "	11.75
No. 3	8.05 "	9.25	9.20 "	11.25
No. 4	7.70 "	9.50	8.90 "	10.75

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper, Delivered in Zone 1:

No. 1 Glossy Coated	$11.90 @	$13.50
No. 2 Glossy Coated	10.35 "	11.75
No. 3 Glossy Coated	9.55 "	11.00
No. 4 Glossy Coated	9.15 "	10.50
No. 1 Antique (watermarked)	9.05 "	$10.50
No. 2 Offset	8.40 "	9.75
A Grade E. F.	8.20 "	9.50
A Grade S. & S. C.	8.45 "	9.75
B Grade E. F.	7.65 "	8.75
B Grade S. & S. C.	7.90 "	9.00
C Grade E. F.	7.35 "	8.50
C Grade S. & S. C.	7.60 "	8.75
D Grade E. F.	7.10 "	8.25
D Grade S. & S. C.	7.35 "	8.50

Ivory & India at $.50 cwt. extr.

Mechanical Pulp

(On Dock, Atlanta Ports)

No. 1 Imported—	
Moist	No prices
Dry	No prices

(Delivered)

No. 1 Domestic and Canadian	40.00	@	42.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.72½	@	3.87½
Prime Qualities—			
Easy-Bleaching Sulphite	3.17½	"	3.75
Strong Unbleached Sulphite	3.17½	"	3.75
News Grade, delivered			
Unbleached Sulphite	58.00	"	61.50

(On Dock, Atlantic Ports)

Kraft Bleached	4.12½	"	
Kraft Light & Strong	3.50	"	3.75
Kraft No. 1	3.40	"	3.60

(F. o. b. Pulp Mill)

Kraft Domestic and Canadian	2.75	"	3.37½

(Delivered)

Soda Bleached	3.30	"	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.

Shirt Cuttings—			
New White, No. 1.	6.50	@	6.75
Silesias No. 1	4.50	"	4.65
New Unbleached	6.25	"	6.50
Blue Overall	4.35	"	4.50
Fancy	3.25	"	3.50
Washables	2.00	"	2.15
Mixed Khaki Cuttings	2.75	"	3.00
O. D. Khaki Cuttings	3.00	"	3.15

Old Rags

White, No. 1—			
Repacked	3.50	"	3.65
Miscellaneous	2.75	"	3.00
White, No. 2—			
Repacked	2.50	"	2.75
Miscellaneous	2.00	"	2.25
Thirds and Blues—			
Repacked	1.50	"	1.65
Miscellaneous	1.10	"	1.25
Roofing Rags—			
No. 1	1.15	"	1.20
No. 2	1.00	"	1.05
No. 3 (bagging)	.90	"	1.00
No. 4	.60	"	.65
No. 5A	.60	"	.65

Foreign Rags

All prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxford	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—

J. Andersen & Co.

Selling Agents

21 East 40th Street

New York

CHEMICAL & MECHANICAL PULP

Kraft Pulp

BERGVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
KALIX TRÄINDUSTRI AKTIEBOLAG
Vanaförden, Sweden
MUNKSUNDS AKTIEBOLAG
Munksund, Sweden
NEMSJÖ CELLULOSA A.-B.
Sprängsvikan, Sweden

Bleached Sulphite

KELLNER-PARTINGTON PAPER PULP CO., LTD.
Sarpsborg, Norway
Edmonton, Sweden
Hallein & Villach, Austria

Unbleached Sulphite

AKTIESELSKABET GREAKER CELLULOSEFABRIK
Greaker, Norway
BERGVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
CELLULOSEFABRIKS A.-G.
Bratislava, Czecho-Slovakia
SVANÖ AKTIEBOLAG
Svanö, Sweden

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ON SHORTEST POSSIBLE NOTICE

We make all kinds of Mill Cogs and have special facilities that will be of great service to you. We make a specialty of "ready dressed" cogs which are

READY TO RUN

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SLITTERS FOR VULCANIZED FIBRE
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ENGLISH ECCO CLAYS CLAYS

ECCO CLAYS
TRADE MARK

UNIFORM • SUPERIOR • DEPENDABLE

English China Clays Sales Corporation
551 Fifth Avenue, New York City

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens.	3.00	"	—
Checks and Blues...	2.00	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o .b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	2.50	"	2.75
Wool Tares, light...	2.00	"	2.25
Wool Tares, heavy..	2.12½	"	2.25
Bright Bagging	2.25	"	2.50
Manila Rope—			
Foreign	5.25	"	5.50
Domestic	5.25	"	5.50
Jute Threads.....	2.62½	"	2.75
Sisal Strings.....	2.10	"	2.35
Mixed Strings.....	1.10	"	1.20

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.10	@	3.25
Ordinary Hard White No. 1....	2.25	"	2.50
Soft White No. 1..	1.80	"	1.90
Soft White Extra..	2.50	"	2.60
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag.....	.90	"	1.00
Solid Flat Book....	.80	"	.85
Crumbled No. 1...	.70	"	.75
Ledger White Stock.	1.70	"	1.75
Ledger Stock Colored	1.30	"	1.40
Manila—			
New Env. Cut....	1.70	"	1.80
New Cuttings.....	1.30	"	1.40
Old Kraft Machine Compressed bales..	1.40	"	1.50
News—			
No. 1 White News	1.75	"	1.90
Strictly Overissue.	.70	"	.75
Strictly Folded....	.52½	"	.57½
Corrugated	.47½	"	.52½
No. 1 Mixed Paper..	.27½	"	.32½

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.18	@	—
White Hemp.....	.18	"	—
Fine Polished—			
Fine India.....	.22	"	—
Unpolished—			
Box	.16	"	—
Paper Makers.....	.13	"	—
Tube Rope.....	.14¾	"	—
Wall Paper.....	.16	"	—
Wrapping	.16	"	—
Soft Fiber Rope...	.14	"	—
Cotton	.24	"	—

(Hard Fiber)

Medium Java.....	.10	"	—
Mex. Sisal.....	.09½	"	—
Manila	.23	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f.o.b. Phila.)

Shirt Cuttings—			
New White No. 1.	.06½	@	.07
New White No. 2.	.03½	"	.04
Light Silesias.....	—	"	.04½
Silesias, No. 1....	—	"	.04
Black Silesias, soft	—	"	.03
New Unbleached...	.06	"	.06¼
Washable Prints...	.02¾	"	.02½
Washable, No. 1..	—	"	.01½
Blue Overall.....	.04	"	.04½
Cottons—According to grades—			
Washable shredding	—	"	.01½
Fancy Percales....	—	"	.03
New Black Soft...	.02½	"	.02¾
New Light Seconds	—	"	.04
New Dark Seconds	—	"	1.50
Khaki Cuttings—			
No. 1 O. D.....	.03½	"	.03¾
No. 2 Mixed.....	.01¾	"	.02
Corduroy	.01¾	"	.01½
New Canvas.....	.04½	"	.05
New Black Mixed.	—	"	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	"	3.00
Thirds and Blues—			
Miscellaneous	1.35	"	1.50
Repacked	1.55	"	1.65
Black Stockings (Export)	3.50	"	4.00
Roofing Stock—			
Foreign No. 1.....Nominal			
Domestic No. 1...	1.10	"	1.15
Domestic No. 2...	.95	"	1.00
Roofing Bagging..	.85	"	.90

Bagging

(f.o.b. Phila.)

Gunny, No. 1—			
Foreign .....Nominal			
Domestic	2.25	@	2.50
Manila Rope.....	—	"	5.50
Sisal Rope.....	2.00	"	2.25
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	2.55	"	2.75
No. 2.....	—	"	1.50
Wool Tares, heavy..	3.75	"	4.00
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	2.25	"	2.50

Old Papers

(f.o b Phila.)

Shavings—			
No. 1 Hard White	2.40	@	2.50
No. 2 Hard White	2.10	"	2.15
No. 1 Soft White	1.90	"	2.00
No. 2 Soft White	1.60	"	1.75
No. 1 Mixed.....	.90	"	1.00
Solid Ledger Stock..	1.90	"	2.00
Ledger Stock, white.	1.50	"	1.60
Ledger Stock, colored	1.10	"	1.15
No. 1 Books, heavy..	.80	"	.85
Manila Cuttings.....	1.75	"	1.80
Print Manila.....	.50	"	.55
Container Manila....	.40	"	.45
Kraft Paper.....	1.25	"	1.30
No. 1 Mixed Paper..	.25	"	.30
Straw Board Chip...	.30	"	.35
Binders Board Chip..	.30	"	.35
Corrugated Board...	.50	"	.60
Overissue News.....	.70	"	.75
Old Newspapers.....	.50	"	.55

BOSTON

Old Papers

(f.o.b. Boston)

Shavings—			
No. 1 Hard White	2.75	@	3.00
No. 1 Soft White	2.00	"	2.25
No. 2 Mixed.....	.75	"	.80
Solid Ledger Books..	1.50	"	1.75
Overissue Ledger Stock	1.75	"	2.00
Mixed Ledgers.....	1.50	"	1.75
No. 1 Heavy Books	1.10	"	1.20
No. 1 Books, Light..	.75	"	.85
Crumpled Stitchless Book Stock.....	.75	"	.85
Manila Env. Cuttings	1.85	"	2.00
Manila Envelope Cuttings extra quality	2.35	"	2.60
White Blank News..	1.40	@	1.50
No. 1 Kraft.....	1.25	"	1.30
Extra No. 1 Kraft...	1.00	"	1.65
Mixed Papers.....			
Print Manila.....	.55	"	.60
Container Manila...	.60	"	.70
Old Newspapers.....	.50	"	.55
Paper Wool Strings.	.95	"	1.10
Overissue News.....	1.00	"	1.10
Box Board Chips....	.40	"	.45
Corrugated Boxes...	.55	"	.60
Kraft corrugated boxes	.90	"	1.00
New Kraft Corrugated Cuttings	1.45	"	1.60
Screening Wrappers.	.70	"	.80

Bagging

(f.o.b. Boston)

Gunny Bagging—			
Foreign	2.70	"	—
Domestic	2.25	"	2.40
Sisal Rope.....	2.25	"	2.50
Mixed Rope.....	.85	"	1.00
Transmission Rope—			
Foreign	—	"	2.40
Domestic	2.00	"	2.25
Soft Jute Rope.....	3.25	"	3.50
Manila Rope—			
Foreign	5.00	"	5.25
Domestic	4.75	"	5.00
Jute Carpet Threads	2.00	"	2.25
Bleachery Burlap....	4.00	"	3.25
Scrap Burlap—			
Foreign	2.35	"	2.50
Domestic	2.15	"	2.35
Scrap Sisal.....	2.25	"	2.50
Scrap Sisal for Shredding	2.30	"	2.65
Wool Tares—			
Foreign, Heavy...	2.40	"	2.50
Domestic	2.40	"	2.50
Aust. Wool Pouches.	2.75	"	3.00
New Burlap Cuttings	3.75	"	4.00
Heavy baling bagging	2.75	"	3.00
Paper Mill Bagging..	1.75	"	2.00
No. 2 Bagging.....	.75	"	.80

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.03
Fancy Percales....	.04	"	.04¼
New White No. 1.	.06¾	"	.07
New Light Flannelettes	.05	"	.05¼
Canton Flannel, Bleached	—	"	.06½
Underwear Cutters, Bleached	—	"	.06½
Silesias No. 1.....	.05	"	—
New Black Silesias..	3.00	"	3.25
Red Cotton Cuttings	.04	"	.05
Soft Unbleached...	.07	"	.07½
Blue Cheviots.....	.05	"	.05½
Fancy	.02	"	.02½
Washable	.02	"	.02¼
Cottons—According to Grades—			
Blue Overalls.....	.04¾	"	.05
New Black. Soft..	.03	"	.03¼
Khaki Cuttings....	.02½	"	.03
O. D. Khaki.....	.02½	"	.03¼
Corduroy	.02¾	"	.03
New Canvas.....	.06¾	"	.07¼
B. V. D. Cuttings ..	.07	"	.07¼

Domestic Rags (Old)

(F. o.b. Boston)

White No. 1—			
Repacked	2.75	"	2.75
Miscellaneous	2.40	"	2.60
White No. 2—			
Repacked	1.90	"	2.00
Miscellaneous	2.00	"	2.25
Twos and Blues.....	2.00	"	2.25
Old Blue Overalls ..	1.40	"	1.50
Thirds and Blues—	1.50	"	1.75
Miscellaneous	1.25	"	1.35
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.20	"	1.30
No. 2.....	.95	"	1.00
No. 3.....	.85	"	.95

Foreign Rags

(F. o. b. Boston)

Canvas	.04¼	@	—
Dark Cottons.....(nominal)			
Dutch Blues.....(nominal)			
New Checks and Blues(nominal)			
Old Fustians.....(nominal)			
Old Linsey Garments.(nominal)			
New Silesias.....(nominal)			

CHICAGO

Waste Paper

(f.o.b. Chicago)

Shavings—			
No. 1 White Envelope cuttings....	3.15	@	—
No. 1 Hard White	2.50	"	2.65
No. 1 Soft White.	2.00	"	2.20
Ledger and Writings	.85	"	.95
Solid Books.....	.95	"	1.10
Blanks	1.50	"	1.60
Krafts	1.40	"	1.50
New Kraft Cuts.....	1.60	"	1.75
Overissue News.....	1.00	"	1.10
Old Newspapers—			
No. 1 Folded News	.70	"	.80
No. 1 Mixed Paper	.40	"	.50
Roofing Stocks—			
No. 1.....	.95	@	1.00
No. 2.....	.85	"	.90

Paper Box Sales Higher

CHICAGO, Nov. 28, 1940—Basing his forecast on October statistics for the industry, A. E. Murphy, secretary of the Folding Paper Box Association of America, said today that "1940 can easily be the best year for both orders entered and shipments made, if present trade trends continue.

Box shipments during October, which is the period when deliveries for Christmas packages are made, ran 2 per cent above October, 1939, the industry's previous all-time record month. Shipments for the ten months of 1940 were 6 per cent higher. Exports, although a minor factor in the box business, were more than twice the total of the 1939 period.

October shipments also showed a better than seasonal increase of 16.3 per cent above September. Orders booked, reported earlier in the month, ran 1.4 per cent above October, 1939, and 25.7 per cent above September, 1940.

Salesmen Plan Party

Following the custom of former years the Salesmen's Association of the Paper Industry will hold its annual Christmas party in the Florentine room of the Lexington Hotel, New York, on December 23.

The doors will open at noon and a special menu has been prepared for the occasion. Music will be provided by an accordionist, with singing and other features in keeping with the good fellowship which has always been present at this informal event.

Members and non-member representatives of the paper industry are welcome. It is suggested that reservations should be telephoned promptly to Ashland 4-3755.